PLANT MATERIALS PROJECT SUMMARY REPORTS

from the Natural Resources Conservation Service to the National Park Service

FY 2016

U.S. DEPARTMENT OF THE INTERIOR • U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES, CONSERVATION SERVICE • NATIONAL PARK SERVICE

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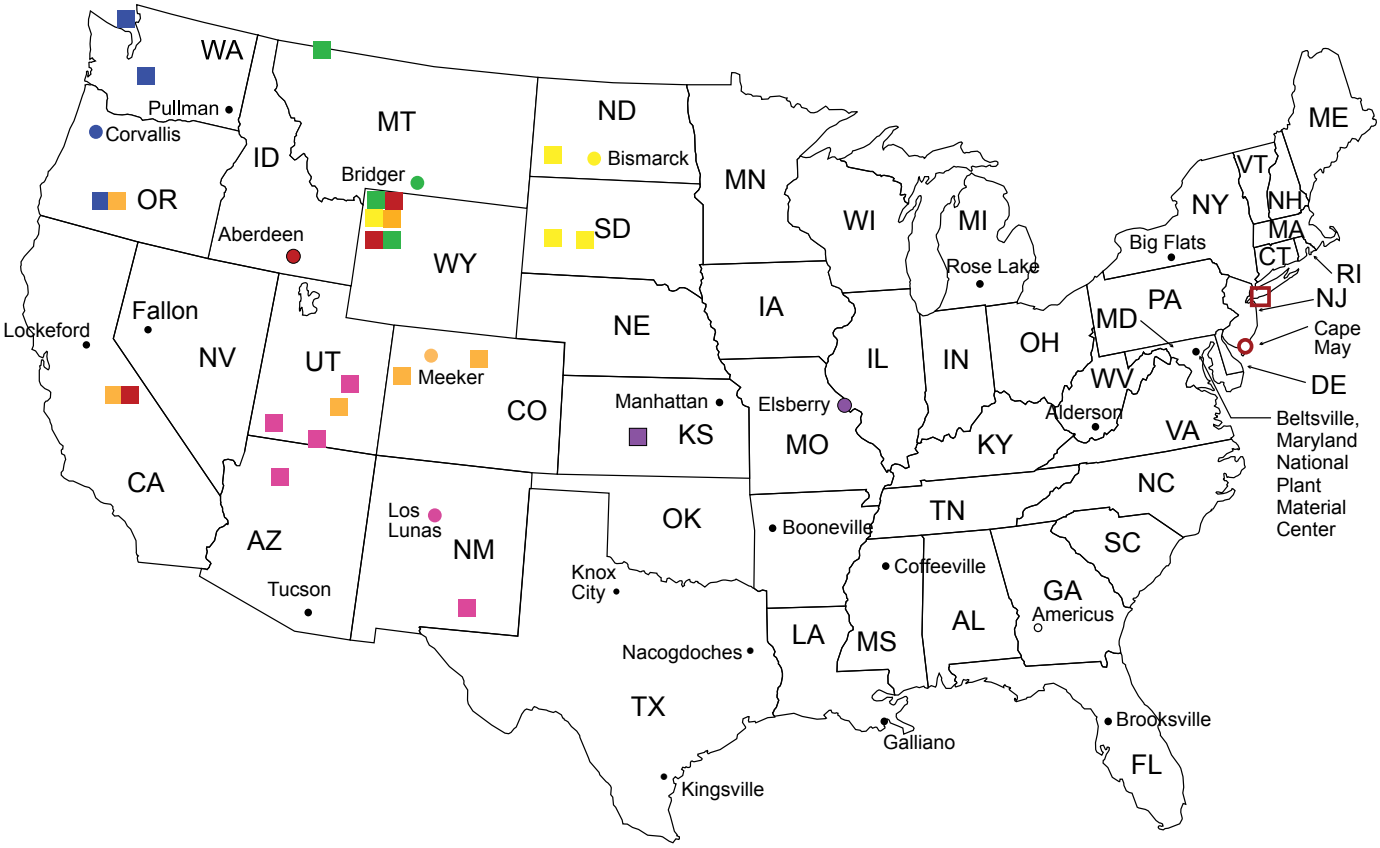
MORA	Mount Rainier National Park
MTPMC	Bridger, Montana, Plant Materials Center
NDPMC	Bismarck, North Dakota, Plant Materials Center
NJPMC	Cape May, New Jersey, Plant Materials Center
NMPMC	Los Lunas, New Mexico, Plant Materials Center
NPS	National Park Service
NRCS	Natural Resources Conservation Service
ORPMC	Corvallis, Oregon, Plant Materials Center
PLS	Pure Live Seed
PMC	Plant Materials Center
ROMO	Rocky Mountain National Park
TAPR	Tallgrass Prairie National Preserve
THRO	Theodore Roosevelt National Park
UCEPC	Upper Colorado Environmental Plant Center, Meeker, Colorado
USDA	US Department of Agriculture
USDOI	US Department of the Interior
YELL	Yellowstone National Park
YOSE	Yosemite National Park
ZION	Zion National Park

NPS/NRCS Interagency Plant Materials Centers



Plant Materials Center		In cooperation with these National Park Units
Aberdeen, ID	●	Grand Teton, Yellowstone, Yosemite
Bismarck, ND	●	Badlands, Grand Teton, Mount Rushmore, Theodore Roosevelt
Bridger, MT	●	Glacier, Grand Teton, Yellowstone
Cape May, NJ	○	Gateway
Corvallis, OR	●	Crater Lake, Mount Rainer, San Juan Island
Elsberry, MO	●	Fort Larned
Los Lunas, NM	●	Arches & Canyonlands, Carlsbad Caverns, Glen Canyon, Grand Canyon, Zion
Meeker, CO	●	Bryce Canyon, Crater Lake, Colorado National Monument, Rocky Mountain, Yellowstone, Yosemite

INTRODUCTION

This is the 2016 Natural Resources Conservation Service (NRCS) Plant Materials Center's (PMC) annual summary report on all interagency agreements between the National Park Service (NPS) and the Natural Resources Conservation Service. These projects relate to development of native plant materials for revegetation of park roads and other restoration projects. The National Park Service and the Natural Resources Conservation Service have been cooperating in testing and increasing native plant materials through a memorandum of understanding using interagency agreements since 1989.

The cooperating NRCS Plant Materials Centers and the Upper Colorado Environmental Plant Center (UCEPC) have prepared a park summary report for each of their projects. This summary report is a compilation of all the individual reports. The report is made available by request and is sent to all national parks with current plant materials projects, associated park resource managers, respective plant materials centers, and US Department of Agriculture (USDA) NRCS state offices. Plant species naming conventions follow USDA Plants Database.

Additional printed copies or electronic versions of this report may be requested from

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FISCAL YEAR 2016 PROGRAM SUMMARY

2016 Cooperating NRCS Plant Centers:

- Aberdeen, Idaho
- Bismarck, North Dakota
- Bridger, Montana
- Cape May, New Jersey
- Corvallis, Oregon
- Elsberry, Missouri
- Los Lunas, New Mexico

Cooperating Conservation District Plant Center—Meeker, Colorado

Native Seed and Plant Production

- 20 national parks
- 3,852 bulk lbs of seed
- 41,744 plants
- more than 160 different native species grown

Park-Collected Native Seed Processed

- 8 national parks
- 240 wildland collections
- one mechanically in-field harvested collection (FlalVac)
- more than 790 lbs of seed
- more than 160 different species

NRCS National Technical Advisor Activities

Technical

- Assistance for DSC professional staff engineers, landscape architects, project specialists, and project managers at the NPS Denver Service Center relative to revegetation project needs with 14 national parks in addition to those with interagency agreements.
- Assistance to 33 national parks and associated staff.

Development and Administration of Interagency Agreements

- Four new agreements, nine new task orders, and seven modifications to agreements totaling $1,174,894 in funding were coordinated by the NRCS national technical advisor.
- A total of 38 interagency agreements were administered and coordinated.
- There were 38 active projects at 20 national park units that cooperated with 7 NRCS plant materials centers, and 1 conservation district plant materials center.

Interagency Agreements and Task Orders Reviewed

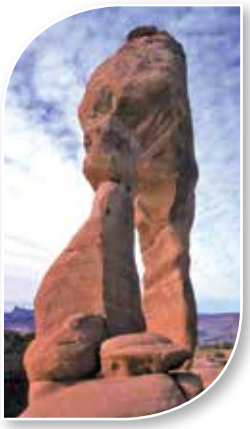
Arches and Canyonlands National Parks
Badlands National Park
Bryce Canyon National Park
Carlsbad Caverns National Park
Colorado National Monument
Crater Lake National Park
Dinosaur National Monument
Fort Larned National Historic Site
Gateway National Recreation Area
Glacier National Park
Glen Canyon National Recreation Area
Grand Canyon National Park
Grand Teton National Park
Great Smoky Mountains National Park
Mount Rainier National Park
Mount Rushmore National Park
Palo Alto National Historical Park
Rocky Mountain National Park
Theodore Roosevelt National Park
Sequoia and Kings Canyon National Parks
Tallgrass Prairie National Preserve
Yosemite National Park
Yellowstone National Park
Zion National Park

Technology Transfer and Research

- Training and information provided included basic Federal Lands Highway Program guidelines, examples of revegetation specifications, tools (seed collection techniques, seed storage, seed mix design, plant salvage, propagation, cost estimates, and plant monitoring). Links to the NRCS Plant Materials Program, NRCS Electronic Field Office Technical Guide, and plant propagation protocols websites were provided at training sessions and conferences, and as requested.
- Provided seed collection training, seed mix designs, pollinator information and general revegetation program technical support to more than 45 NPS staff and nine national parks.
- The NRCS national technical advisor, program, and contract staff prepared and distributed to cooperating park/plant material centers and to key NPS and NRCS personnel 225 copies of the fiscal year 2015 annual interagency summary report.

INTERMOUNTAIN REGION

Arches and Canyonlands National Parks, Utah



Prepared by: **Los Lunas, New Mexico, USDA NRCS Plant Materials Center**

Introduction. On August 27, 2010, an agreement between the US Department of Interior National Park Service (NPS) Southeast Utah Group (Arches and Canyonlands National Parks) and the USDA-NRCS Los Lunas New Mexico Plant Materials Center (NMPMC) was made for the collection, propagation, and increase of native grass seed collected by the park staff. Increased seed of Indian ricegrass (*Achnatherum hymenoides*) is used by the National Park Service to restore project areas within the two national parks.

Accomplishments. A new interagency agreement was initiated 08/08/2016 to continue seed production of two 0.5 acre fields of *Achnatherum hymenoides* through 2018. Seed production and seed shipments are summarized in the following tables.

Arches National Park								
Scientific Name	**Common Name**	**Accession Number**	**Park Location**	**2016 Field Size (Acres)**	**Harvest Year**	**PLS (lbs)**	**Cleaned Bulk Inventory (lbs)**	**Test Date**
Achnatherum hymenoides	Indian ricegrass	9066888	N/A	0.5	2016	11.83	14.9	10/26/2016
Canyonlands National Park								
Scientific Name	**Common Name**	**Accession Number**	**Park Location**	**2016 Field Size (Acres)**	**Harvest Year**	**PLS (lbs)**	**Cleaned Bulk Inventory (lbs)**	**Test Date**
Achnatherum hymenoides	Indian ricegrass	9066907	Island in the Sky	0.26	2016	4.7	5.26	11/15/16
Achnatherum hymenoides	Indian ricegrass	9066908	Needles	0.50	2016	13.9	20.0	1/18/2017

Seed Shipment

Scientific Name	Common Name	Accession Number	NRCS Lot Number	Viability (%)	Amount Shipped
Achnatherum hymenoides	Indian ricegrass	9066888	SFP-14-F27N ARCH	No Test	7.0 lbs (bulk)
—	—	—	SFP-92-ARCHES	71	313 grams PLS
Achnatherum hymenoides	Indian ricegrass	9066907	SFP-13-F24NCANYN	96	6.1 lbs PLS
—	—	—	SFP-14-F24NCANYN	75	8.8 lbs
Achnatherum hymenoides	Indian ricegrass	9066908	SFP-13-F33NCANYN	78	423 grams PLS
—	—	—	SFP-14-F33NCANYN	—	2.9 lbs (bulk)

Canyonlands National Park, Indian ricegrass (*Achatherum hymenoides,* Accession 9066907 Islands in the Sky), Los Lunas, New Mexico, May 2016.

Bryce Canyon National Park, Utah

Prepared by: **Meeker, Colorado, Upper Colorado Environmental Plant Center**

Introduction. Indefinite Delivery/Indefinite Quantity (ID/IQ) Contract AG-8B05-C-12-0002 was initiated June 26, 2012. Task Order No. P12PD12573 identified Upper Colorado Environmental Plant Center (UCEPC) to manage native seed production of two 0.5 acre fields; Indian ricegrass (*Achnatherum hymenoides*) and nodding brome grass (*Bromus anomalus*) for Bryce Canyon National Park (BRCA). Task Order No. P15PD02452 was initiated in August of 2015 for one additional year of production of both species in 2016.

Accomplishments. The Upper Colorado Environmental Plant Center harvested both species in 2016. The Indian ricegrass produced a little better than average bulk lbs but very high quality seed. The nodding brome field rebounded nicely after an apparent lygus pest infection in 2015. This year, the brome produced 64.5 clean lbs of seed.

One shipment was made on September 16, 2016, that included 148 lbs of nodding brome and 35 lbs of Indian ricegrass.

The following table shows information for the last four years of production for these two species.

Bryce Canyon National Park							
Scientific Name	Common Name	Field Size (Acres)	Harvest Year	PLS (lbs)	Bulk Delivered (lbs)	Bulk Inventory (lbs)	Test Date
Bromus anomalus	nodding brome	0.5	2011	59.9	191.0	0.0	1/30/12
			2012	1.3	0.0	3.5	1/22/13
			2013	14.2	0.0	28.0	3/7/14
		0.7	2014	51.1	0.0	86.0	2/26/15
			2015	13.6	0.0	34.0	2/11/16
			2016	38.2	0.0	64.5	3/2/17
Achnatherum hymenoides	Indian ricegrass	0.5	2012		0.0	0.0	Re-Planted
			2013	7.09	19.5	0.0	3/7/14
			2014	20.82	24.0	0.0	2/26/15
			2015	34.81	0.0	36.25	3/24/16
			2016	26.55	25.97	33.0	6/23/2017

Technology Development. Standard cultural practices, harvest, and cleaning protocols were used to produce seed of *Achnatherum hymenoides* and *Bromus anomalus*.

Bryce Canyon National Park, nodding brome (*Bromus anomalus*), Meeker, Colorado, 2016.

Forb and Grass Seed Increase

Introduction. Indefinite Delivery/Indefinite Quantity (ID/IQ) Contract No. AG-8B05-C-12-0002 was initiated March 17, 2015. Task Order No. P16PD03151 requested a repeat of all actions conducted in the previous Task Order, No. P12PD12573. Specifically, fields produced seed of bottlebrush squirreltail and six forbs and provided 100 containerized snowberry plants from park-obtained cuttings.

Accomplishments. The 0.4 acre field of bottlebrush squirreltail produced 17.4 lbs of clean seed on July 26, 2016. Additionally, all planted forbs produced seed in 2016. On September 16, 2016, there were 82 snowberry plants, 10.2 lbs of bottlebrush, and seed of six species of forbs in small quantities delivered to Cedar City, Utah, for Bryce Canyon trail revegetation projects. The harvested clean seed amounts are provided in the table below. Four of the annual forbs were replanted with 2016 produced seed for seed production in 2017. These forbs were planted on October 18, 2016, into Field 16 South and included *Corydalis*, *Dracocephalum, Erysimum*, and *Machaeranthera*. *Packera* and *Cirsium*, both biennials or short-lived perennials, remain in production and were not replanted. Because of limited information on cultural aspects of *Corydalis*, including field establishment, a separate germination trial is being conducted with this species. The following table recaps planting and production of each species.

Bryce Canyon National Park								
Scientific Name	**Common Name**	**Field Size**	**Harvest Year**	**Bulk Weight**	**Bulk Delivered**	**PLS %**	**PLS (lbs)**	**Test Date**
Elymus elymoides	bottlebrush squirreltail	0.40 acre	2015	10.2 lbs	2.4	79.8	8.14	10/2/15
		—	2016	17.4 lbs	—	73.34	12.76	10/25/16
Cirsium wheeleri	Wheeler's thistle	560 ft	2016	159 grams	159 grams	NA	NA	NA
Corydalis aurea	scrambled eggs (fumewort)	100 ft	2016	15 grams	—	NA	NA	NA
Dracocephalum parviflorum	American dragonhead	100 ft	2016	3.6 lbs	3.2 lbs	NA	NA	NA
Erysimum asperum	western wallflower	1,625 ft.	2016	5.2 lbs	4.6 lbs	NA	NA	NA
Machaeranthera canescens	hoary tansyaster	75 feet	2016	61 grams	43 grams	NA	NA	NA
Packera multilobata	lobeleaf groundsel	250 ft.	2016	16 grams	—	NA	NA	NA

Technology Development. Specific cultural practices, harvest, and cleaning protocols were used to produce seed from each product and to establish annual and biennial forbs.

Bryce Canyon National Park, wall flower (*Erysimum asperum*), Meeker, Colorado, 2016.

Carlsbad Caverns National Park, New Mexico

Prepared by: **Los Lunas, New Mexico, USDA NRCS Plant Materials Center**

Introduction. On August 23, 2004, an agreement between the USDA-NRCS Los Lunas New Mexico Plant Materials Center (NMPMC) and the Carlsbad Caverns National Park (CAVE) was made for the collection, propagation, and increase of native grass species. This work continued in a new agreement in 2010 that expired in 2012. The table summarizes the entire inventory of seed shipped to the park in 2016.

Seed production and inventory are summarized in the following table.

Carlsbad Caverns National Park				
Scientific Name	**Common Name**	**Accession**	**NRCS Lot Number**	**Shipped PLS (lbs)**
Bouteloua gracilis	blue grama	9066604	SFP-06-F13 CCNP	13.8
			SFP-07-F13 CCNP	8.1
			SFP-08-F13 CCNP	2.8
			SFP-09-F13 CCNP	2.6
			SFP-11-F13 CCNP	7.8
Leptochloa dubia	green sprangletop	9066658	SFP-10-F24N CCNP	27.4
			SFP-10-F24N CCNP	10.9
Setaria vulpiseta	plains bristlegrass	9066606	SFP-07-F20S CCNP	17.4
			SFP-08-F20&28CCP	72.0
			SFP-09-F20&28CCP	24.2
			SFP-10-F20&28CCP	14.5
			SFP-11-F20&28CCP	39.0
Aristida purpurea	purple threeawn	9066607	SFP-07-F24S CCNP	7.9
			SFP-08-F24S CCNP	3.0
			SFP-09-F24S CCNP	287.0 grams
			SFP-11-F24S CCNP	359.0 grams
Bouteloua curtipendula	sideoats grama	9066605	SFP-05-F23N CCNP	40.9
			SFP-06-F23N CCNP	36.3
			SFP-07-CARY CCNP	3.0 (bulk)
			SFP-07-F23N CCNP	17.1
			SFP-08-CARY CCNP	1.0 (bulk)
			SFP-08-F23N CCNP	40.1
			SFP-09-CARY CCNP	181 (bulk grams)
			SFP-09-F23N CCNP	13.5
			SFP-10-F23N CCNP	6.2
			SFP-11-F23N CCNP	337.8 (grams)

Bulk seed amounts were not sent for testing because of an insufficient amount of seed, or the seed on hand was from the park collections.

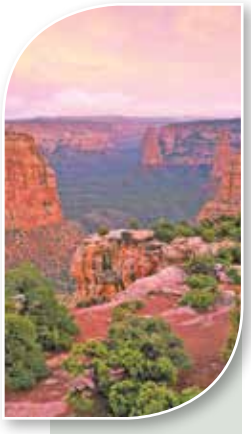


Photo credit: Rob Kurtzman

Colorado National Monument, Colorado

Prepared by: **Meeker, Colorado, Upper Colorado Environmental Plant Center**

Introduction. Indefinite Delivery/Indefinite Quantity (ID/IQ) Contract AG-8B05-C-12-0002, Task Order No. P14PD03601 was modified on July 16, 2016, to add options for seed production of Indian ricegrass (A*chnatherum hymenoides*), Sandberg bluegrass (*Poa secunda*), and Utah sweetvetch, (*Hedysarum boreale*), through the field season of 2019. An additional task order (P16PD02015) was initiated for seed production of Salina wildrye (*Leymus salina*) through 2019.

Accomplishments. In 2016, the Upper Colorado Environmental Plant Center maintained fields of Sandberg bluegrass, Utah sweetvetch and Indian ricegrass and obtained small seed yields from all materials. From collections conducted by Colorado National Monument staff, the Upper Colorado Environmental Plant Center established a 0.5 acre field of Salina wildrye on August 5, 2016, in a spaced planting that was conducted by hand. The Upper Colorado Environmental Plant Center also assisted in seed collection of this species on June 27, 2016.

All fields are now established with seed production expected for years 2017–2019.

Summary of seed increase fields at the Upper Colorado Environmental Plant Center is presented in the following table.

Colorado National Monument

Scientific Name	Common Name	Fields Planted (Acres)	Harvest Year	Field Size (Acres)	Cleaned Bulk (lbs)	PLS (lbs)	Cleaned Bulk Inventory (lbs)	Test Date
Achnatherum hymenoides	Indian ricegrass	9/1/15	2015 2016	0.67	6.7 4.8	6.1 3.83	6.7	1/25/16 3/2/17
Hedysarum boreale	Utah sweetvetch	8/7/15	2016	0.13	—	—	trace	NA
Poa secunda	Sandberg bluegrass	7/29/15	2016	1.2	—	—	trace	NA
Leymus salinus	Salina wildrye	8/5/2016	—	0.5	—	—	—	—

Colorado National Monument, Sandberg bluegrass (*Poa secunda*), Meeker, Colorado, 2016.

Glacier National Park, Montana

Prepared by: **Bridger, Montana, USDA NRCS Plant Materials Center**

Introduction. The Bridger Montana Plant Materials Center (MTPMC) has maintained a cooperative agreement with Glacier National Park (GLAC) since FY1986. This agreement facilitates the collection, increase, and establishment of indigenous plant materials and the development of technologies for the restoration of disturbances resulting from road construction and other projects within park boundaries.

Accomplishments. In 2016, 61 seed lots representing 42 species were delivered to Glacier National Park or used for MTPMC seed increase. Total weight of seed delivered was 5.42 lbs. Seed distribution included 8 grasses (7 species), 31 forbs (18 species), and 22 woody plants (17 species). In addition, 323 containerized plants of *Arctostaphylos uva-ursi* (9078619) for Lake McDonald – Low were delivered to the park in 2016. A total of 74 wildland seed collections for Glacier National Park were processed at the Bridger Montana Plant Materials Center in 2016 and are reported in the Glacier National Park 2016 Annual Technical Report.

Seed increase fields as of December 31, 2016, appear in the first table below. No new seed production fields were installed for Glacier National Park in 2016. Four fields were retired, including *Festuca idahoensis* (9081497), *Phleum alpinum* (9054559), *Poa alpina* (9054561), and *Trisetum spicatum* (9081997). These fields had either reached their seed production lifespan or had been winter damaged or killed.

Containerized plants delivered in 2016 and held in cold storage as of December 31, 2016, are listed in the second table below.

Glacier National Park seed increase fields as of December 2016.

Glacier National Park									
Scientific Name	**Common Name**	**Accession Number**	**Park Location GLAC Lot ID**	**Planting Date**	**Field Size (Acres)**	**Harvest Year**	**PLS (lbs)**	**Bulk Cleaned Seed (lbs)**	**Test Date**
Bromus carinatus	California brome	9087612	Lake McDonald – Medium (Park ID #11-080)	5/05/14	0.03	2015	21.5	23.9 11.51	2/25/2016
Bromus vulgaris	Columbia brome	9088297	Many Glacier (Park ID #11-136)	6/20/13	0.06	—	—	9.50	—
Carex microptera	small wing sedge	9087799	Lake McDonald (Park ID #08-028)	6/07/11	0.03	—	—	1.50	—
Elymus glaucus	blue wildrye	9075846	Saint Mary – Low (Park ID #11-031)	6/20/13	0.06	—	—	1.30	—
Eurybia conspicua	eastern showy aster	9087433	Lake McDonald – Fish Creek (Park ID #04-247	7/01/14	0.03	—	—	0.42	—
Eurybia conspicua	eastern showy aster	9088061	Saint Mary-Low (Park ID 09-295	6/23/13	0.03	—	—	2.29	—
Festuca idahoensis	Idaho fescue	9081497	Two Medicine (09-052)	8/21/15	0.33	—	—	removed	—
Phleum alpinum	alpine timothy	9054559	Logan Pass (Park ID #10-363)	8/03/12	0.03	—	—	removed	—
Poa alpina	alpine bluegrass	9054561	Logan Pass (Park ID #1993)	8/13/12	0.03	—	—	removed	—

Glacier National Park									
Scientific Name	Common Name	Accession Number	Park Location GLAC Lot ID	Planting Date	Field Size (Acres)	Harvest Year	PLS (lbs)	Bulk Cleaned Seed (lbs)	Test Date
Potentilla arguta ssp. *arguta*	tall cinquefoil	9087975	Saint Mary (Park ID 10-115)	8/13/15	0.015	—	—	0.21	—
Potentilla hippiana	wooly cinquefoil	9063269	Saint Mary (Park ID 09-127)	8/13/15	0.03	—	—	no fill	—
Pseudoroegneria spicata	bluebunch wheatgrass	9081993	SM-Two Dog Flats (11-058)	8/21/15	0.05	—	—	no fill	—
Symphyotrichum laeve var. *geyeri*	Geyer's aster	9078605	Lake McDonald (Park ID #11-149)	8/15/12	0.04	—	—	1.04	—
Symphyotrichum laeve var. *geyeri*	Geyer's aster	9078464	Many Glacier – Low (Park ID #10-197)	6/20/13	0.05	—	—	2.47	—
Trisetum spicatum	spike trisetum	9081997	Saint Mary – Low (Park ID #12-081)	6/20/13	0.06	—	—	removed	—

Containerized plants delivered in 2016 and held in cold storage, as of December 31, 2016

Glacier National Park							
Scientific Name	Common Name	Accession Number	Park Location and (GLAC Lot ID) #	Planting Date	Units#	Container size Cubic Inches	Delivery Status
Arctostaphylos uva-ursi	kinnikinnick	9078619	Lake McDonald-Low (08-154)	10/14/14	323	—	Delivered
Mahonia repens	Oregon grape	9091051	Grinnel Trailhead Many Glacier-Low (14-041)	1/26/15	23	—	Held in storage

Technology. Two training sessions were held in 2016 involving park personnel. On May 10 and 11, the plant materials center staff traveled to Glacier National Park and discussed a variety of subjects including asexual plant propagation, plant fertility, and nursery irrigation. The second workshop was held at the Bridger Plant Materials Center grounds on October 18 and 19 and included NPS Denver Service Center staff and Glacier, Yellowstone, and Grand Teton National Parks personnel. A variety of subjects were covered by the NRCS plant materials program staff including wildland seed collecting, seed processing, understanding a seed analysis report, developing a seed mix, pollinator enhancement plantings, proper site preparation and planting, and seeding calculations.

Group photo of the training participants at the Bridger Montana Plant Materials Center, Bridger, Montana, 2016.

Glacier National Park, nursery crew with Bridger Montana Plant Materials Center produced plants, Glacier National Park, 2016.

Glen Canyon National Recreation Area, Utah

Prepared by: **Los Lunas, New Mexico, USDA NRCS Plant Materials Center**

Introduction. In 2013, an agreement between the US Department of Interior National Park Service Glen Canyon National Recreation Area (GLCA) and the USDA-NRCS Los Lunas New Mexico Plant Materials Center (NMPMC) was made to facilitate the propagation of seed collected by GLCA staff for the purpose of increasing the native grasses, shrubs, and tree species available to revegetate park lands. The terms of this agreement were modified and extended to December 31, 2017, to continue the seed production of purple threeawn.

Accomplishments. The plant materials staff completed the containerized production of species and delivered the remaining 851 containerized plants to the Glen Canyon National Recreation Area and assisted in the installation of 285 tallpot plants. Seed and plant production as well as shipment and deliveries for 2016 are detailed in the following tables.

Seed production and shipment

Glen Canyon National Recreation Area									
Scientific Name	Common Name	Accession Number	Lot Number	Field Size (Acres)	Harvest Year	Cleaned Bulk (lbs)	PLS Inventory (lbs)	PLS Shipped (lbs)	Test Date
Aristida purpurea	purple threeawn	9067016	SFP-13-F21S GLEN SFP-14-F21S GLEN	0.25	2016	0.86	NA	0.7 1.1	*No test

*Seed was not sent for testing because of an insufficient amount of seed.

Plant production and delivery

Glen Canyon National Recreation Area			
Scientific Name	Common Name	Accession Number	Plants Delivered in 2016
Altriplex confertifolia	shadescale saltbush	9067019	500
Altriplex canescens	fourwing saltbush	9067020	30
Baccharis emoryi	Emory's baccharis	9067022	100
Ericameria nauseosa	rubber rabbitbrush	9067024	36
Populus fremontii	Fremont cottonwood	9067025	43
Salix gooddingii	Goodding's willow	9067026	106
Pluchea sericea	arrowweed	9067027	36

Grand Canyon National Park, Arizona

Prepared by: **Los Lunas, New Mexico, USDA NRCS Plant Materials Center**

Introduction. In July of 1990, an agreement between the National Park Service and the Los Lunas New Mexico Plant Materials Center (NMPMC) was made to collect, propagate, and increase native grasses, forbs, shrubs, and trees for the purpose of revegetating disturbed areas and native landscaping projects in the Grand Canyon National Park (GCNP). This agreement and subsequent agreements included both the north and south rim areas of the park.

Accomplishments. The products delivered for the expired agreement in 2016 are summarized in the following tables.

Seed Production

Grand Canyon National Park						
Scientific Name	Common Name	Accession Number	Field Size Acres	Clean Bulk (lbs)	PLS Inventory (lbs)	Test Date
Achnatherum hymenoides	Indian ricegrass	9066904	0.41	17.90	15.68	11/9/2016
Hesperostipa comata	needle-and-thread	9066797	0.50	9.40	8.48	11/23/2016

Seed Shipment

Grand Canyon National Park				
Scientific Name	Common Name	Accession Number	Lot Number	Amount shipped PLS (lbs)
Poa fendleriana	muttongrass	9062861	SFP-10-F20&28 GCP	1.5
—	—	—	SFP-11-F28S GCNP	65.8 grams
—	—	—	SFP-12-F28S GCNP	74.7
—	—	—	SFP-13-F33N GCNP	6.7
—	—	—	SFP-14-F33&24 GCP	7.2
Penstemon sp.	beardtongue	9062862	SFP-97-F2 GCNP	90.7 (bulk grams)
—	—	—	SFP-98-F2 GCNP	1.8 (bulk)
—	—	9066054	SFP-93-F8 GCNP	6.0 (bulk)
Bouteloua gracilis	blue grama	9062875	SFP-09-F20&28GCP	2.1
—	—	—	SFP-10-F20&28GCP	15.0
—	—	—	SFP-11-F18&28GCP	4.2
—	—	—	SFP-12-F18,20GC	28.9
—	—	—	SFP-13-F18,20&28	28.5
—	—	—	SFP-14-F18,20GCP	16.6
Bouteloua curtipendula	sideoats grama	9066732	SFP-09-F25&34GCP	238 (grams)
Hesperostipa comata	needle-and-thread	9066797	SFP-12-F28SGCNP	422 (grams)
—	—	—	SFP-13-F28&24GCP	4.4
—	—	—	SFP-14-F28&24GCP	3.3
—	—	—	SFP-15-F28, 24GCP	9.1
Muhlenbergia wrightii	spike muhly	9066802	SFP-10-F20S GCNP	9.3

Grand Canyon National Park				
Scientific Name	**Common Name**	**Accession Number**	**Lot Number**	**Amount shipped PLS (lbs)**
—	—	—	SFP-11-F20S GCNP	12.3
—	—	—	SFP-12-F20S GCNP	170.6 (grams)
—	—	—	SFP-13-F20S GCNP	120.0 (grams)
Bouteloua gracilis	blue grama	9066803	SFP-10-F21S GCNP	8.4
—	—	—	SFP-11-F21S GCNP	4.4
—	—	—	SFP-12-F21S GCNP	23.7
—	—	—	SFP-13-F21S GCNP	1.5
—	—	—	SFP-14-F21S GCNP	1.3
Achnatherum hymenoides	Indian ricegrass	9066904	SFP-15-F14GCNP	3.8

*Seed was not sent for testing

Hesperostipa comata, accession 9066797, seed production at Los Lunas, New Mexico, in 2016.

Grand Teton National Park, Wyoming

Prepared by: **Aberdeen, USDA NRCS Plant Materials Center**

Introduction. The Aberdeen Idaho Plant Materials Center (IDPMC) entered into an interagency agreement with Grand Teton National Park (GRTE) in 2006 to produce seed of four native grasses for use in revegetation of disturbed areas following road construction. Since that time, several modifications have been made to the agreement to extend production fields or add new species.

Accomplishments. Seed fields of slender wheatgrass (*Elymus trachycaulus*), Sandberg bluegrass (*Poa secunda*), blue wildrye (*Elymus glaucus*) and mountain brome (*Bromus marginatus*) were planted in 2006, and seed was harvested in 2007 and 2008. Fields of Idaho fescue *(Festuca idahonensis*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) were planted in May 2008. Seed from the bluebunch wheatgrass fields was harvested in 2009 and 2010, and the field was then discontinued in late 2010 because of poor seed yield. The original Idaho fescue field was harvested from 2009 to 2014. In 2010, a second field of mountain brome was planted for seed harvests in 2011 and 2012. A new Idaho fescue field (1 acre) was established in 2012 for seed production in 2013 through 2014 but was extended to 2015. In 2015, 2 acres each of mountain brome and Idaho fescue and a 1-acre field of blue wildrye were established. The blue wildrye field produced approximately 300 lbs of bulk seed but had only 7% germination according to the Idaho State Department of Agriculture seed tests. The Aberdeen Idaho Plant Materials Center followed up with an in-house test and produced similar results. In 2015, 650 x 6 ft rows of Sulphur buckwheat (*Eriogonum umbellatum*), showy goldeneye (*Heliomeris multiflora*), and one-flower sunflower (*Helianthella uniflora*) using greenhouse grown materials were also installed. Sulphur buckwheat had excellent establishment but has not produced any seed as of 2016. Showy goldeneye had fair establishment from the transplants, and a small amount of seed was harvested in 2015. A full harvest was done in 2016. One-flower sunflower did not establish from transplants or direct seeding efforts. In 2016, the Aberdeen Idaho Plant Materials Center assisted with harvesting the slender wheatgrass (*Elymus trachycaulus*) in the Elbo West field at Grand Teton National Park, and the seed was processed at the PMC.

Seed production and inventory is summarized in the following table.

Grand Teton National Park

Scientific Name	Common Name	Field Size (Acres)	Year Planted	2016 Cleaned Bulk (lbs)	2016 PLS (lbs)	Total PLS Inventory (lbs)	Test Date
Bromus marginatus	mountain brome	2.0	2015	453	321	*1,329	4/11/17
Elymus glaucus	blue wildrye	1.0	2015	309	22	22	4/11/17
Elymus trachycaulus	slender wheatgrass	13.6	NA**	642	481	481	4/17/17
Festuca idahoensis	Idaho fescue	1.0	2012	236	165	1069	4/19/17
Helianthella uniflora	one-flower sunflower	6′ by 650′	2015	0	0	1.0	10/10/14
Heliomeris multiflora	showy goldeneye	6′ by 650′	2015	3.9	3.8	4.4	2/17/17
Eriogonum umbellatum	sulphur buckwheat	6′ by 650′	2015	15	0	1.0	12/13/13

* Includes prior harvests
** In situ harvest of Elbo West field in 2016

To date, the PMC has delivered 7,668 lbs of seed to Grand Teton National Park during this project. The PMC currently has 1,329 lbs of mountain brome, 1069 lbs of Idaho fescue, 481 lbs of slender wheatgrass, 22 lbs of blue wildrye, and 4.4 lbs of showy goldeneye in inventory (not including the originally provided seed).

Grand Teton National Park, *Bromus marginatus*, Aberdeen, Idaho, 2016.

Grand Teton National Park, *Elymus trachycaulus*, in situ harvest of Elbo West field at Grand Teton National Park, 2016.

Prepared by: **Bismarck, North Dakota, USDA NRCS Plant Materials Center**

Introduction. On July 29, 2015, the Natural Resources Conservation Service (NRCS), Bismarck North Dakota Plant Materials Center (NDPMC) entered into an interagency agreement with the Grand Teton National Park to grow and produce seed of slender wheatgrass (*Elymus trachycaulus*) and mountain bromegrass (*Bromus marginatus*) for use in Jenny Lake Renewal, Hayfields Restoration, and Federal Land Highways Program Gros Ventre Junction. Fields were planted at the Bismarck North Dakota Plant Materials Center in 2015 with seed originating from the park. The PMC maintains seed from a previous contract that expired in 2014. Seed will be distributed to the park for reclamation activities. The contract expires on December 31, 2018.

Accomplishments. One-acre fields of both slender wheatgrass and mountain bromegrass are established at the PMC. Both fields were fertilized in April with 40 lbs of actual nitrogen (urea 46-0-0). Weed control included herbicide application, tilling between rows, and hand weeding. The slender wheatgrass was harvested by combine. The seed from the mountain bromegrass was lost by seed shatter caused by high winds and stormy conditions prior to seed harvest. Seed was distributed to the park on October 12, 2016, from inventory of remaining seed from a prior contract.

Seed production and distribution are summarized in the following table.

Grand Teton National Park								
Scientific Name	Common Name	Accession Number	Date Planted	Field Size (Acres)	Harvest Year	PLS (lbs)	Distribution 2016 lbs	Test Date
Bromus marginatus	mountain brome	9094354	4/22/15	1.0	2015 2016	292.5 0	339.00	5/11/2015
Elymus trachycaulus	slender wheatgrass	9094353	5/21/2015	1.0	2015 2016	264.2 273.4	273.40	4/6/2015 4/12/2017

Grand Teton National Park, *Elymus trachycaulus*, accession 9094353,Bismarck, North Dakota, May 2016.

Prepared by: **Bridger, Montana, USDA NRCS Plant Materials Center**

Introduction. In 2011, the Bridger Montana Plant Materials Center (MTPMC) entered into cooperative agreements with Grand Teton National Park for seed increase and technology development of native grass species. In 2016, a new multi-year agreement was initiated to increase one-acre each of Idaho fescue (*Festuca idahoensis*) and bluebunch wheatgrass (*Pseudoroegneria spicata*).

Accomplishments. In 2016, four lots of seed totaling 283.2 PLS lbs were picked up GRTE staff, see table below. There were no existing seed increase fields remaining in production in 2016. Two wildland seed collections for seed increase of *Festuca idahoensis* (accession number 9091154) and *Pseudoroegneria spicata* (9091155), were sent to the MTPMC, processed, tested, recleaned, and retested (Table 2). An additional 0.85 bulk lbs of *Pseudoroegneria spicata* (9091155) were sent to MTPMC by GRTE in 2016, as well as two bulk lbs of year 2013 *Pseudoroegneria spicata* (9088209) increase, which was not needed. Two, 1-acre planting sites were prepared in Field 21 at MTPMC for spring 2017 planting.

Seed picked up by Grand Teton National Park staff, October 2016.

Grand Teton National Park					
Scientific Name	Common Name	Accession Number	Seed Lot ID	Bulk Seed Delivered (lbs)	PLS Delivered (lbs)
Pseudoroegneria spicata	bluebunch wheatgrass	9088209	SCO-14-GTF12	70	63.50
			SCO-12-GTFLD12	6	5.17
Bromus marginatus	mountain brome	9088217	SCO-13-GTF12BR	39	35.32
			SCO-14-GTF12BR	204	179.23

Seed lot data for Grand Teton National Park seed increase planned in 2017 at the Bridger Montana Plant Materials Center.

Grand Teton National Park					
Scientific Name	Common Name	Number	Date	Acres	Seed Inventory PLS (lbs)
Festuca idahoensis	Idaho fescue	9091154	April 2017	1	5.96
Pseudoroegneria spicata	bluebunch wheatgrass	9091155	April 2017	1	4.96

The current total bulk and PLS seed in storage at the Bridger Montana Plant Materials Center appears in the following table.

Seed in inventory for Grand Teton National Park, March 1, 2017.

Grand Teton National Park					
Scientific Name	Common Name	Accession Number	Lot I D	Total Bulk (lbs)	PLS (lbs)
Festuca idahoensis	Idaho fescue	9088206	SCO-14-GTF12	297.8	288.9
			SCO-15-GTF12	50.0	46.5
Poa secunda	Sandberg bluegrass	9088212	SCO-14-GTF12POA	76.0	68.8
			SCO-15-GTF12POA	0.5	NA
Poa secunda	Sandberg bluegrass	9090925	SCO-14-GTF20	60.0	44.0
			SCO-15-GTF20	5.0	NA

Technology Development. Grand Teton Park staff participated in the plant materials training workshop held at the Bridger Montana Plant Materials Center grounds on October 18 and 19. A variety of subjects were covered by the NRCS plant materials program staff, including wildland seed collecting, seed processing, understanding a seed analysis report, developing a seed mix, pollinator enhancement plantings, proper site preparation and planting, and seeding calculations.

Grand Teton National Park. Seed processing of *Poa secunda*, accession 9090925, Bridger, Montana, July 2016. Montana, July 2015.

Rocky Mountain National Park, Colorado

Prepared by: **Meeker, Colorado, Upper Colorado Environmental Plant Center**

Introduction. Upper Colorado Environmental Plant Center (UCEPC) and Rocky Mountain National Park (ROMO) initiated an Indefinite Delivery/Indefinite Quantity (ID/IQ) Contract AG-8B05-C-12-0002, Task Order P17PD00194, Rocky Mountain National Park – Seed for Revegetation Projects on December 20, 2016. This task order involves the delivery of seed of previously produced ROMO germplasm to Rocky Mountain National Park by or before January 31, 2017.

Accomplishments. Seed production fields of products that yielded well for Rocky Mountain National Park from previous agreements were maintained in anticipation of use for future revegetation projects within the park. Three primary species—wooly brome, Canada wildrye, and bottlebrush squirreltail—were produced in 2013 for the specific PLS pound amount under contract and in 2014 for likely future use of the germplasm with no contract. These products, along with four other species that had also been previously produced by UCEPC for the park, were available for purchase from inventory.

The following table above provides a complete recap of the seed shipped by the Upper Colorado environmental Plant Center in 2017. The task order is complete; there is no seed remaining in inventory, and this is the final report related to this project.

Rocky Mountain National Park								
Scientific Name	Common Name	Planting Date	Harvest Year	Field Size (Acres)	Clean Bulk (lbs)	PLS (lbs)	Bulk Shipped (lbs)	Test Date
Muhlenbergia montana	mountain muhly	5/28/03	2014	0.5	7.6	4.93	7.6	3/6/15
Bromus lanatipes	woolly brome	8/10/12	2014	1.0	303	239.4	303.0	3/2/15
Elymus canadensis	Canada wildrye	8/2/2011	2013	0.5	222.0	139.9	222.0	3/2014
			2014	1.5	303.5	264.53	303.5	3/2015
Elymus elymoides	bottlebrush wildrye	6/23/2009	2013	0.73	128.0	101.65	128.0	3/14
			2014	0.3	35.0	33.39	35.0	3/15
Elymus glaucus	blue wildrye	8/5/2008	2011	0.1	2.0	NA	2.0	NA
Potentilla pulcherrima	beautiful cinquefoil	6/26/2008	2011	0.17	12.0	NA	12.0	NA
Antennaria rosea	rose pussytoes	5/18/2009	2013	Plot	324 grams	NA	324 grams	NA

Yellowstone National Park, Wyoming

Prepared by: **Aberdeen, Idaho, USDA NRCS Plant Materials Center**

Introduction. In 2008, the Natural Resources Conservation Service (NRCS), Aberdeen Idaho Plant Materials Center (IDPMC), entered into an interagency agreement with Yellowstone National Park (YELL) to produce seed of Sandberg bluegrass (*Poa secunda*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and needle-and-thread (*Hesperostipa comata* ssp. *comata*) for use on restoration sites at the park.

Accomplishments. The needle-and-thread was harvested as hay mulch and baled for transport to the park in 2010 through 2012. Needle-and-thread is no longer in production at the Aberdeen Idaho Plant Materials Center. Seed was harvested from the Sandberg bluegrass field in 2010 through 2013 and the bluebunch wheatgrass field in 2011 to 2013. New, 2.5-acre seed fields of Sandberg bluegrass and bluebunch wheatgrass were planted in May 2013 to produce seed in 2014 and 2015. These fields were extended for production in 2016 and then were discontinued. A new 2.0-acre field of bluebunch wheatgrass was installed in 2016.

Seed production and inventory is summarized in the following table.

Yellowstone National Park							
Scientific Name	Common Name	Acres	Year Planted	2016 Cleaned (lbs)	2016 PLS (lbs)	Total PLS Inventory (lbs)	Test Date
Poa secunda	Sandberg bluegrass	2.5	2013	155	105	508	4/17/17
Pseudoroegneria spicata	bluebunch wheatgrass	2.5	2013	89	60	150	4/12/17

The Aberdeen Idaho Plant Materials Center currently holds 508 lbs PLS of Sandberg bluegrass and 150 lbs PLS of bluebunch wheatgrass in inventory.

Cleaning Yellowstone National Park *Poa secunda*, Aberdeen, Idaho, 2016.

Yellowstone National Park Pseudoroegneria spicata seed, Aberdeen, Idaho, 2016.

Prepared by: **Bridger, Montana, USDA NRCS Plant Materials Center**

Introduction. The Bridger Montana Plant Materials Center (MTPMC) has maintained cooperative agreements with Yellowstone National Park (YELL) since 1986. These agreements facilitate the collection, increase, and reestablishment of indigenous plant materials and the development of revegetation technologies for restoring road construction and other improvement project disturbances within park boundaries. Yellowstone National Park forecasts future road construction projects with indigenous seed and/or plant collection needs. Production efforts will begin three years in advance of project initiation. Wildland seed collections are collected by YELL staff, dried, and delivered to the PMC for processing, accessioning, and entry into a database.

Accomplishments. In 2016, eight allocations of 46 seed lots were distributed to Yellowstone National Park for use in revegetation projects and to the Bridger Montana Plant Materials Center and the Upper Colorado Environmental Plant Center for use in seed increase fields. The seed distribution included 29 grass lots (18 species) totaling 784.5 lbs and 17 forb lots (13 species) totaling 16.5 lbs. The 46 wildland seed collections were processed at the Bridger Montana Plant Materials Center and yielded a total of 42.5 lbs of bulk seed, including 39.3 lbs from 22 grasses lots (12 species), 2.8 lbs from 22 forbs lots (17 species), and 0.37 lbs from two shrubs lots (one species).

Seed increase fields of 10 grass accessions (six species) and one forb accession were harvested on 3.68 acres, resulting in 446.7 lbs of bulk seed production. The increase field of tufted hairgrass (*Deschampsia cespitoa*) was maintained but not harvested because of poor seedhead development. Five new seed increase fields (1.9 acres) were planted in 2016. Three fields were planted on April 4, one on July 12, and one on November 15, 2016. There are currently 6.74 acres of 14 grass accessions (nine species) and two forb accessions (two species) planted to seed increase fields at the PMC.

Reference the Yellowstone National Park 2016 Annual Technical Report for wildland and seed increase inventories dating from 2006 through 2016.

Seed production is summarized in the following table.

Yellowstone National Park							
Scientific Name	**Common Name**	**Accession Number/ YELL Site Number**	**Date Planted**	**Field Size (Acres)**	**2016 Bulk Clean Seed (lbs)**	**PLS Seed (lbs)**	**Test Date**
Achillea millefolium	common yarrow	9091090 Site 64	5/27/15	0.14	6.0	5.68	1/12/17
Achnatherum hymenoides	Indian ricegrass	9081862 Site 64	11/8/13 10/9/15	0.33 0.83	removed 41	34.93	12/29/2016
Bromus anomalus	nodding brome	9081696 Site 140	4/13/2016	0.24	new	—	—
Bromus marginatus	mountain brome	9088024 9087449/ Site 146 9087448/ Site 85	8/23/13 2016 5/26/15 4/13/16	0.33 0.87 .54	35 removed 155 34	26.89 —	3/27/17 —
Deschampsia cespitosa	tufted hairgrass	9088028/ Site 17	8/23/13	0.33	No fill	—	—
Elymus glaucus	Blue wildrye	908030/ 9082035/ Site 5	7/12/16	0.12	New	—	—

Yellowstone National Park							
Scientific Name	**Common Name**	**Accession Number/ YELL Site Number**	**Date Planted**	**Field Size (Acres)**	**2016 Bulk Clean Seed (lbs)**	**PLS Seed (lbs)**	**Test Date**
Elymus trachycaulus	slender wheatgrass	9087474 9076214/ Site 128 9081526/ Site 41&17	7/31/14 5/26/15 8/21/12	0.53 0.51 0.33 0.46	removed 10 135	88 130.15	3/14/17
Festuca idahoensis	Idaho fescue	9081537 9087461 9087325/ Site 89	5/27/15 9/11/2015	0.33 0.36 0.33	removed removed 0.78	—	—
Leymus cinereus	basin wildrye	9081887	8/17/10	0.33	30	?	—
Penstemon procerus	littleflower penstemon	9081647/ Site 31	11/15/16	0.14	New	—	—
Pseudoroegneria spicata	bluebunch wheatgrass	9081759/ Site 140	4/12/16	0.84	New	—	—

Technology Development. Yellowstone National Park staff participated in the plant materials training workshop held at the Bridger Montana Plant Materials Center grounds on October 18 and 19. A variety of subjects were covered by the NRCS plant materials program staff, including wildland seed collecting, seed processing, understanding a seed analysis report, developing a seed mix, pollinator enhancement plantings, proper site preparation and planting, and seeding calculations.

Leymus cinereus, accession 9081887, July 2016.

Elymus trachycaulus, accession 9081525, June 2016.

Gardiner Basin

Introduction. The Bridger Montana Plant Materials Center (MTPMC) has maintained a cooperative agreement with Yellowstone National Park (YELL) Gardiner Basin since FY2008. This agreement facilitates the collection, increase, and reestablishment of indigenous plant materials and the development of revegetation technologies for the restoration of native perennial grasses where desert alyssum (*Alyssum desertorum*) currently dominates fields of the northern park boundary. Yellowstone National Park forecasts future restoration projects with indigenous seed and/or plant collection needs. Production efforts will begin three years in advance of project initiation.

Accomplishments. In 2016, one grass seed increase field of slender wheatgrass (*Elymus trachycaulus*), accession 9081525, was harvested from 0.8 acres, resulting in 403.5 lbs of bulk seed production. Fields of Sandberg bluegrass (*Poa secunda*), 9090791, and bluebunch wheatgrass (*Pseudoroegneria spicata*), 9087860, were removed from production because of excessive weed pressure and poor stand quality. One new seed increase field (1.0 acre) of Indian ricegrass (*Achnatherum hymenoides*), 9081862, was planted on November 15. There are currently 1.8 acres of two grass accessions (two species) planted to seed increase fields at the Bridger Montana Plant Materials Center.

Seed production is summarized in the following table.

Yellowstone National Park							
Scientific Name	Common Name	Accession Number	Date Planted	Field Size (Acres)	2016 Clean Bulk (lbs)	PLS (lbs)	Test Date
Elymus trachycaulus	slender wheatgrass	9081525/ Site 41&17	8/16 & 8/21/12	1.26	403.5	389	3/14/2017
Achnatherum hymenoides	Indian ricegrass	9081862/ Site 64	11/15/2016	1.0	new	—	—
Poa secunda	Sandberg bluegrass	9090791	8/14/12	0.96	removed	—	—
Pseudoroegneria spicata	bluebunch wheatgrass	9087860	8/14/12	0.34	removed	—	—

Technology Development. The Bridger Montana Plant Materials Center worked on several technology development projects. A trial adding radish seed to grass seed to improve crop row delineation was tested. After the target grasses established, the radishes were terminated. The radish seedlings were effective at delineating rows, reducing the risk of plant injury during field cultivation activities. A new Wintersteiger® plot combine was used that enhanced seed harvesting and improved bulk processing of seed.

Pseudoroegneria spicata, accession 9081759, April 2016.

Wintersteiger plot combine.

Prepared by: Meeker, Colorado, Upper Colorado Environmental Plant Center

Introduction. This report covers activities that have been conducted by Upper Colorado Environmental Plant Center (UCEPC) for Yellowstone National Park through an Indefinite Delivery/Indefinite Quantity (ID/IQ) Contract AG-8B05-C-12-0002, Task Order P16PD01915. The task order calls for the Upper Colorado Environmental Plant Center to produce seed of bluebunch wheatgrass (*Pseudoroegneria spicata*) and green needlegrass (*Nassella viridis*) in large fields and plots of 4-5 forbs.

Accomplishments. The bluebunch field was established in 2015 and produced seed in 2016. The green needlegrass field was planted on July 28, 2016. *Four forbs*, *Ionactis alpinus*, *Stenotus acaulis*, *Plantago patagonica*, and *Musineon divericatum*, were planted in various size plots on August 10 and 11, 2016.

One seed shipment was made to Yellowstone National Park on December 7, 2016. Of the 2015 bluebunch wheatgrass seed lot, 39 clean lbs (28.85 PLS lbs) were shipped.

Yellowstone National Park								
Scientific Name	Common Name	Year	Date Planted	Field Size (Acres)	Harvest Date	Clean Bulk (lbs)	PLS (lbs)	Test Date
Pseudoroegneria spicata	bluebunch wheatgrass	2016	7/31/15	1.0	7/14/2016	55.0	42.6	12/27/16
Nassella viridis	green needlegrass	2016	7/28/16	1.0	NA	—	—	—
Ionactis alpinus	lava aster	2016	8/10/16	.002	NA	—	—	—
Musineon divericatum	musineon	2016	8/11/16	.03	NA	—	—	—
Plantago patagonica	woolly plantain	2016	8/11/16	.044	NA	—	—	—
Stenotus acaulis	cushion goldenweed	2016	8/11/16	.015	NA	—	—	—

Technology Development. Standard planting, cultural practices, harvest, and cleaning protocols were used to produce bluebunch wheatgrass.

Yellowstone National Park, *Pseudoroegneria spicata*, June 2016.

Zion National Park, Utah

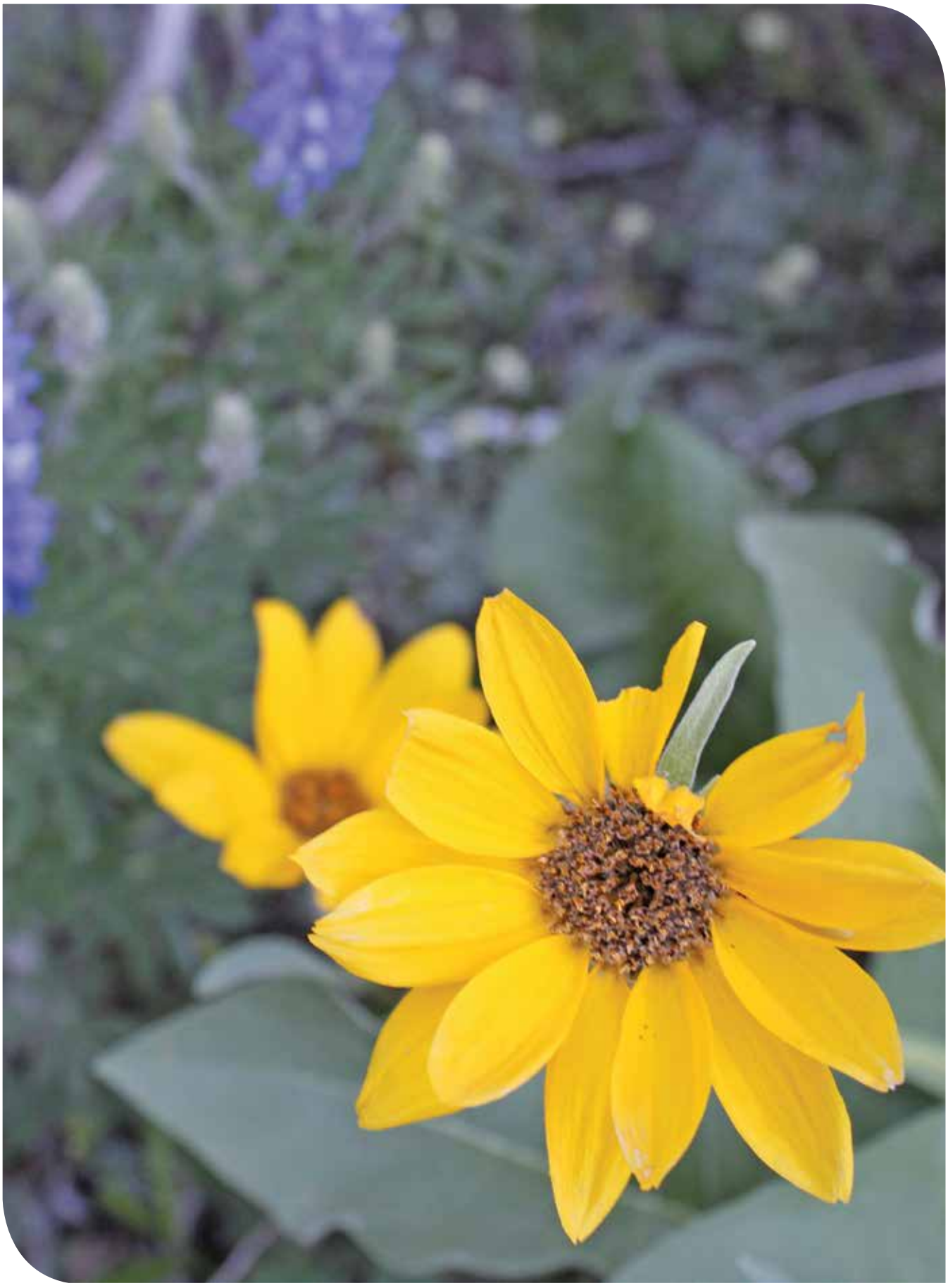
Prepared by: **Los Lunas, New Mexico, USDA-NRCS Plant Materials Center**

Introduction. The Los Lunas New Mexico Plant Materials Center has had a long-standing partnership with Zion National Park spanning over a decade. The last agreement with the park ended in 2013.

The entire inventory of seed shipped to Zion National Park in 2016 is summarized in the table below.

Zion National Park					
Scientific Name	**Common Name**	**Accession**	**Viability (%)**	**Lot Number**	**PLS Shipped (lbs)**
Elymus elymoides	bottlebrush squirreltail	9066532	92	SFP-05-F19 ZION	14.3
—	—	—	84	SFP-07-F19 ZION	246 (grams)
—	—	—	91	SFP-08-F26N ZION	2.6
—	—	—	92	SFP-08-F26N&19 ZI	13.7
—	—	—	74	SFP-11-F20,34,19	12.5
—	—	—	49	SFP-11-F20,34VAC	13.8
—	—	—	63	SFP-12-F20,19ZIO	46.0
—	—	—	38	SFP-13-F19ZION	78.1
Bothriochloa barbinodis	cane bluestem	9066543	*No test	SFP-03-F21S ZION	272 (bulk grams)
—	—	—	78	SFP-04-F21S ZION	1.3
—	—	—	87	SFP-05-F21S ZION	2.2
—	—	—	76	SFP-06-F21S ZION	1.5
—	—	—	*No test	SFP-07-F21S ZION	113 (bulk grams)
Pleuraphis jamesii	James' Galleta	9066586	88	SFP-06-F24-35ZIO	1.5
—	—	—	*No test	SFP-07-F24-35ZIO	272 (bulk grams)
—	—	—	*No test	SFP-08-F35N ZION	227 (bulk grams
Achnatherum hymenoides	Indian ricegrass	9066528	95	SFP-06-F35N ZION	15.5
—	—	—	92	SFP-07-F35N ZION	44.1
—	—	—	97	SFP-08-F35N ZION	26.6
—	—	—	65	SFP-09-F35N ZION	33.1
—	—	—	23	SFP-10-F35N ZION	22.7
—	—	—	72	SFP-11-F35N ZION	27.9
—	—	—	90	SFP-12-F35N ZION	50.0
—	—	—	91	SFP-13-F35N ZION	28.0
—	—	—	95	SFP-06-F35N ZION	15.5
Poa fendleriana	muttongrass	9066531	*No test	SFP-06-F35 ZION	1.8 (bulk)
—	—	—	—	SFP-07-F35 ZION	4.5
—	—	—	—	SFP-08-F35 ZION	333 (grams)
Andropogon hallii	sand bluestem	9066529	*No test	SFP-04-F25S ZION	2.7 (bulk)
—	—	—	85	SFP-05-F25S ZION	2.8
—	—	—	95	SFP-06-F25&27ZIO	8.9
—	—	—	92	SFP-07-F25&27ZIO	3.3
—	—	—	74	SFP-08-F25&27ZIO	9.8

Seed was not sent for testing because of an insufficient amount of seed.



MIDWEST REGION

Badlands National Park, South Dakota

Prepared by: **Bismarck, North Dakota, USDA NRCS Plant Materials Center**

Introduction. The National Park Service has a need to preserve the native plant resources and revegetate disturbed park lands. The National Park Service requires native plants restoration to be accomplished using germplasm from populations as closely related genetically and ecologically as possible to the Park populations. Quantities of native seed are needed to revegetate areas disturbed by construction activities for the Cliff Shelf Slide Repair and Rehab Loop Road Phase IV. The National Park Service has requested assistance from the Bismarck North Dakota Plant Materials Center (NDPMC). The Bismarck North Dakota Plant Materials Center has agreed to increase seed of two selected grass species collected at Badlands National Park (BADL). Technical assistance for planting, growing, and cleaning of seed will also be provided to the park. The interagency agreement was signed on May 22, 2015, and expires December 31, 2018. All seed produced at the PMC will be made available to the National Park Service upon request.

Targeted Species and Goaled Amounts for Contract Period 2015-2018

Badlands National Park			
Scientific Name	**Common Name**	**Accession Number**	**PLS lbs/year**
Pascopyrum smithii	western wheatgrass	9092165	100
Bouteloua gracilis	blue grama	9092168	40

Accomplishments. Seed was distributed to the park on three separate occasions in 2016. Management practices included controlling weeds by herbicide application and hand weeding throughout the season. Dry urea based fertilizer (46-0-0) was applied in April. The blue grama field was burned in May. The fields were harvested in 2016. Seed has been cleaned and sent to the North Dakota State Seed Department for purity and germination tests.

Seed production and distribution summary 2016.

Badlands National Park								
Scientific Name	**Common Name**	**Date Planted**	**Field Size**	**Seed Harvest Date**	**Seed Production (PLS lbs)**	**2016 Seed Distribution to Park (PLS lbs)**	**Inventory as of 12/31/2016 (PLS lbs)**	**Seed Test Date**
Pascopyrum smithii	western wheatgrass	4/22/2015	1.0	7/21/16	128.6	48.6	128.6	2/21/2017
Bouteloua gracilis	blue grama	2012 and 6/1/2015	0.5	8/18/16	92.43	27	204..98	3/10/2017
Nassella viridis	green needlegrass	removed	—	N/A	—	25	426.30	2013 & 2014
Sporobolus cryptandrus	sand dropseed	removed	—	N/A	—	17.26	16.24	2012 and 2013
Elymus trachycaulus	slender wheatgrass	removed	—	N/A	—	25	496.01	2013

The western wheatgrass field is composed of both western wheatgrass and slender wheatgrass. This mix was from the initial seed collection made in the park and used in seeding the field. In 2016 the slender wheatgrass seed was the only seed produced and harvested. No western wheatgrass seed was produced. The 128.6 lbs of seed tested and was identified as slender wheatgrass.

Technology Development. Combine settings, seed cleaning procedures and seed tests have been documented and are available from the PMC.

Badlands National Park, *Bouteloua gracilis*, accession 9092168, May 2016.

Fort Larned National Historic Site, Kansas

Prepared by: **Elsberry, Missouri, USDA NRCS Plant Materials Center**

Introduction. The Elsberry, Missouri Plant Materials Center (MOPMC) entered into an agreement with Fort Larned National Historic Site (FOLS) in 2016 to provide technical expertise in the growing and maintenance of native plant materials. Fort Larned National Historic Site has a need to preserve its native plant resources to revegetate parkland. This requires restoring native plant germplasm from local populations. Because the National Park Service (NPS) does not have the equipment needed to propagate the desired quantities of plants needed for revegetating disturbances at Fort Larned, it was agreed that the National Park Service would provide local germplasm seed stock to the Natural Resources Conservation Service (NRCS), which in turn, would be propagated at the Elsberry Missouri Plant Materials Center.

Accomplishments. In 2016, native seed stock was delivered to the Elsberry Missouri Plant Materials Center and propagation supplies were purchased. Twenty-eight species were sourced from multiple collections for plant prodution. The Tallgrass Prairie National Preserve (TAPR) in Kansas made two collections of seed – one in 2010-2011 and one in 2014-2015. Additional seed was used from the Manhattan Kansas Plant Materials Center (KSPMC) ecoregion collections. All collections made for this project were delivered to Elsberry Missouri Plant Materials Center in 2016 where they were cleaned and stored in a climate controlled location, where temperature is set at approximately 50°F and relative humidity is set at 30%.

Seed collections delivered to the Elsberry Plant Materials Center, in 2016.

Fort Larned National Historic Site		
Scientific Name	**Common Name**	**Source**
Amorpha canescens	leadplant	KSPMC
Andropogon gerardii	big bluestem	KSPMC
Andropogon hallii	sandbluestem	KSPMC
Asclepias syriaca	common milkweed	TPNP 2010/11
Asclepias tuberosa	butterfly milkweed	TPNP 2010/11
Asclepias tuberosa	butterfly milkweed	TPNP 2014/15
Astragalus crassicarpus	groundplum milkvetch	TPNP 2010/11
Baptisia australis	blue wild indigo	TPNP 2010/11
Baptisia australis	blue wild indigo	TPNP 2014/15
Bouteloua curtipendula	side-oats grama	KSPMC
Bouteloua dactyloides	buffalograss	KSPMC
Bouteloua gracilis	Blue grama	KSPMC
Ceanothus americanus	New Jersey tea	TPNP 2010/11
Chamaecrista fasciculata	partridge pea	KSPMC
Cucurbita sp.	Gourd	TPNP 2014/15
Dalea purpurea	purple prairie clover	TPNP 2014/15
Dalea purpurea	purple prairie clover	KSPMC
Delphinium carolinianum	prairie larkspur	TPNP 2010/11
Desmanthus illinoensis	Illinois bundleflower	KSPMC
Echinacea angustifolia	black sampson	TPNP 2010/11
Echinacea angustifolia	black sampson	TPNP 2014/15
Echinacea angustifolia	black sampson	KSPMC

Fort Larned National Historic Site		
Scientific Name	**Common Name**	**Source**
Lespedeza capitata	roundhead lespedeza	TPNP 2010/11
Lespedeza capitata	roundhead lespedeza	TPNP 2014/15
Lespedeza capitata	roundhead lespedeza	KSPMC
Liatris punctata	spotted gayfeather	KSPMC
Mimosa nuttallii	catclaw sensitive brair	TPNP 2010/11
Mimosa nuttallii	catclaw sensitive brair	TPNP 2014/15
Mimosa nuttallii	catclaw sensitive briar	KSPMC
Oenothera macrocarpa	Missouri evening primrose	TPNP 2010/11
Oenothera macrocarpa	Missouri evening primrose	TPNP 2014/15
Panicum virgatum	switchgrass	KSPMC
Penstemon cobaea	prairie beardtongue	TPNP 2010/11
Penstemon cobaea	prairie beardtongue	TPNP 2014/15
Penstemon cobaea	prairie beardtongue	KSPMC
Psoralidium tenuiflorum	wild alfalfa	TPNP 2010/11
Schizachyrium scoparium	little bluestem	KSPMC
Silphium laciniatum	compass plant	TPNP 2010/11
Silphium laciniatum	compass plant	TPNP 2014/15
Silphium laciniatum	compass plant	KSPMC
Sorghastrum nutans	Indiangrass	KSPMC
Tradescantia ohiensis	Ohio spiderwort	TPNP 2010/11

To fulfill the agreement of providing 6,500 native plant propagules, propagation supplies were ordered in 2016 (see table below). Supplies included plant containers, trays, planting medium, inoculant, and fungicide. These materials will be used to stratify seed in a cold-storage room and later grow out in a greenhouse.

Propagation supplies ordered in 2016.

Fort Larned National Historic Site
Supplies Ordered
Ray Leach Cone-tainers SC10
Ray Leach Propagation Trays RL98
Pro-Mix HP Biofungicide and Mycorrhizae
Perlite
Vermiculite
Sand
Captan Fungicide
Rhizobium inoculant

In 2017, native seed will be planted in containers, stratified, and grown in a greenhouse. The Elsberry Plant Materials Center staff will monitor plant germination and establishment over the growing season. Plants will be delivered to Fort Larned in late summer of 2017.

Seed from the native *Mimosa nuttallii* (catclaw sensitive briar) was sourced from the Tallgrass Prairie National Preserve and delivered to the Elsberry Plant Materials Center in 2016 for plant propagation.

Mount Rushmore National Memorial, South Dakota

Prepared by: **Bismarck, North Dakota, USDA NRCS Plant Materials Center**

Introduction. On August 30, 2013, the USDA Natural Resources Conservation Service (NRCS), Bismarck North Dakota Plant Materials Center (NDPMC) entered into an interagency agreement with the USDI National Park Service (NPS), Mount Rushmore National Memorial (MORU). The agreement period is from August 30, 2013, to September 30, 2017. The North Dakota Plant Materials Center agrees to increase seed for use in rehabilitation of social trails at the Mount Rushmore National Memorial. Seed will be collected by NPS staff. The germplasm will be collected from populations as closely related as possible, both genetically and ecologically, to park populations. The seed harvested from these fields will be cleaned, tested, and distributed to Mount Rushmore National Memorial for reclamation projects. The following species and amounts have been agreed upon by both parties.

Targeted Species and Goaled Seed Amounts

Mount Rushmore National Memorial			
Scientific Name	**Common Name**	**Acres of Seed Production**	**Seed Amount (PLS lbs/year)**
Andropogon gerardii	big bluestem	0.8	80
Schizachyrium scoparium	little bluestem	0.8	80

Accomplishments. The big bluestem field produced large amounts of biomass in 2016, but seed production was poor. The little bluestem field continues to struggle with approximately a 60% stand that is unevenly spread throughout the field. This makes it challenging to maintain this field. A small harvest was accomplished in late fall. Management of both fields included a prescribed burn in April. Herbicide applications and hand weeding was performed to control weeds during April and May. Fertilizer was applied in the form of dry urea 46-0-0 in April, and irrigation water was applied during moisture stress periods throughout the summer. Both fields are planned to be burned in the spring of 2017. No seed was distributed to the park in 2016.

The following table reflects the 2013 seed collected by NPS staff for use in establishing production fields.

Mount Rushmore National Memorial					
Scientific Name	**Common Name**	**Accession Number**	**Collection Date**	**Seed Received Bulk (lbs)**	**Cleaned Seed PLS (lbs)**
Andropogon gerardii	big bluestem	9094438	Fall 2013	13.5 lbs	4.1
Schizachyrium scoparium	little bluestem	9094437	Fall 2013	6.5 lbs	1.6

Seed production and inventory are summarized in the following table.

Mount Rushmore National Memorial								
Scientific Name	Species	Date Planted	Seeding Rate PLS (lbs/Acre)	Field Size (Acres)	2016 Seed Harvest Date	2016 Seed Production PLS (lbs)	Inventory as of 12/31/16 (lbs PLS)	Seed Test Date
Andropogon gerardii	big bluestem	May 2014	6.0	0.8	9/13/16	29	107.8	3/23/2017
Schizachyrium scoparium	little bluestem	May 2014	4.0	0.8	9/20/16	2.86	2.86	3/13/2017

Technology Development. All seed harvesting and cleaning protocols have been recorded and are available from the PMC.

Mount Rushmore National Memorial, *Andropogon gerardii*, accession 9094438, April 11, 2016.

Mount Rushmore National Memorial, *Andropogon gerardii*, accession 9094438, September 13, 2016.

Theodore Roosevelt National Park, North Dakota

Prepared by: **Bismarck, North Dakota, USDA NRCS Plant Materials Center**

Introduction. The Natural Resources Conservation Service, Bismarck North Dakota Plant Materials Center (NDPMC) entered into a four-year cooperative agreement with the Theodore Roosevelt National Park (THRO) to provide seed and technical information needed for revegetation of areas disturbed by construction activities in the South Unit Route 10 Scenic Loop Road of the Theodore Roosevelt National Park in western North Dakota. The contract is scheduled from March 12, 2015 through June 16, 2018. The PMC has agreed to produce native grass seed of three species originally collected in THRO by park personnel and PMC staff. The seed produced at the PMC will be distributed to the park for revegetation projects.

The following table summarizes targeted species and goaled seed amounts for contract period 2015-2018.

Theodore Roosevelt National Park			
Scientific Name	**Common Name**	**Accession Number**	**PLS (lbs/yr)**
Bouteloua curtipendula	sideoats grama	9092174	80
Bouteloua gracilis	blue grama	9092173	30
Elymus trachycaulus	slender wheatgrass	9092175	300

Accomplishments. Fields of slender wheatgrass, sideoats grama, and blue grama are being maintained at the PMC. The sideoats grama and blue grama fields were burned in April. Herbicides were applied in April and May to control weeds, and additional weed control was performed with between row tillage and hand weeding. Fertilizer was applied in April to all three fields. The fields were harvested in 2016. Seed was cleaned at the PMC and is being tested for purity and germination by the North Dakota State Seed Lab. No seed was distributed to the park in 2016.

Seed production and inventory are summarized in the following table.

Theodore Roosevelt National Park							
Scientific Name	**Common Name**	**Date Planted**	**Field Size (Acres)**	**2016 Seed Harvest Date**	**2016 Seed Production PLS (lbs)**	**Inventory as of 12/31/2016 PLS (lbs)**	**Seed Test Date**
Bouteloua curtipendula	sideoats grama	2012 and 5/29/15	1.0	8/4/16	208	414	1/25/2017
Bouteloua gracilis	blue grama	2012	0.3	8/17/16	118	148.5	4/11/2017
Elymus trachycaulus	slender wheatgrass	5/21/15	1.0	7/20/16	533	539	3/22/2017
Koeleria macrantha	prairie junegrass	Field removed	0.3	8/17/16	NA	4.01	4/11/2017
Nassella viridula	green needlegrass	Field removed	1.0	8/4/16	NA	1.8	1/25/2017
Pascopyrum smithii	western wheatgrass	Field removed	0	NA	NA	115.45	NA

Technology Development. All seed harvesting and cleaning protocols have been recorded and are available from the Bismarck North Dakota Plant Materials Center.

Theodore Roosevelt National Park, Elymus trachycaulus, accession 9092175, May 2016.

PACIFIC WEST REGION

Crater Lake National Park, Oregon

Prepared by: **Corvallis, OR, USDA NRCS Plant Materials Center**

Introduction. The Corvallis Oregon Plant Materials Center (ORPMC) entered into an agreement with Crater Lake National Park in 2014 to evaluate, test, and propagate native plant materials for revegetation purposes (*East and West Rim Drives Rehabilitation Project*). It was agreed that the Corvallis Oregon Plant Materials Center would clean, visually analyze for viability, and store approximately 50 accessions of wild collected seed lots as well as perform germination trials and develop propagation protocols for rare species, ultimately producing 25,000 container plants to be planted in the park. Under the agreement, the PMC will also provide on-site consultation and training. Activities in 2016 included inspection and cleaning of provided seed, completion of germination trials, production and delivery of 13,600 plants, and site visit/consultation by PMC staff members in August.

Accomplishments. Corvallis Oregon Plant Materials Center staff delivered 13,600 plants to the park on September 13, 2016. They also brought wild collected seed and cleaned seed from previous years. Almost all of the 2016 collected seed and remaining wild collected seed from previous years will be stored in the seed cooler until needed for plant production or requested by the park.

The following table reflects 2016 deliveries and current seed in storage at the Corvallis Oregon Plant Materials Center.

Northeast East Rim Drive

Crater Lake National Park						
Scientific Name	**Common Name**	**Accession**	**Plant Delivery (#)**	**Seed Delivery[1] (g)**	**2016 Collection[1] (g)**	**Total seed in Storage[2] (g)**
Achnatherum occidentalis	needlegrass	9109231	370	320	32	18
Arctostaphylos nevadensis	pinemat manzanita	9109299	785	—	—	—
Arctostaphylos patula	green leaf manzanita	9109300	395	—	—	—
Boechera horizontalis	Crater Lake rockcress	9109236	—	—	—	0.3
Bromus carinatus	California brome	9109238	900	—	—	
Carex halliana	Hall's sedge	9109260	—	126	42	132
Elymus elymoides ssp. *elymoides*	bottlebrush squirreltail	9109246	1100	—	—	—
Ericameria nauseosa	rubber rabbitbrush	9109282	300	—	—	57
Lupinus lepidus var. *lobbii*	prostrate lupine	9109270	200	46	54	10
Phacelia hastata ssp. *compacta*	compact phacelia	9109252	280	101	97	84

Northwest East Rim Drive

Crater Lake National Park						
Scientific Name	**Common Name**	**Accession**	**Plant Delivery (#)**	**Seed Delivery[1] (g)**	**2016 Collection[1] (g)**	**Total seed in Storage[2] (g)**
Achnathrum occidentalis	needlegrass	9109301	300	—	—	—
Aconogonon davisiae var. *davisiae*	Davis' knotweed	9109267	150	49	46	32
Carex breweri	Brewer's sedge	9109240	—	152	58	45
Castilleja arachnoidea	cobwebby paintbrush	9109242	50	—	—	0
Elymus elymoides ssp. *elymoides*	bottlebrush squirreltail	9109261	1200	911	—	—
Eriogonum marifolium	Sierra eriogonum	9109302	—	98	—	41
Eriogonum pyrolifolium var. *coryphaeum*	Alpine buckwheat	9109258	—	153	—	104
Juncus parryi	Parry's rush	9109266	225	200	146	194
Luetkea pectinata	partridge foot	9109249	300	211	52	219
Lupinus lepidus var. *lobbii*	prostrate lupine	9109262	100	219	15	0.2

Central West Rim Drive

Crater Lake National Park						
Scientific Name	**Common Name**	**Accession**	**Plant Delivery (#)**	**Seed Delivery[1] (g)**	**2016 Collection[1] (g)**	**Total seed in Storage[2] (g)**
Achnatherum occidentalis	needlegrass	9109229	370	—	—	181
Aconogonon davisiae var. *davisiae*	Davis' knotweed	9109263	190	—	59	45
Anemone occidentalis	Western pasqueflower	9109233	—	390	1809	3184
Boechera horizontalis	Crater Lake rockcress	9109235	950	—	18	8
Castilleja applegatei	Applegate's paintbrush	9109272	—	—	24	39
Elymus elymoides ssp. *elymoides*	Bottlebrush squirreltail	9109244	900	90	—	67
Ericameria greenei	Greene's goldenweed	9109286	—	124	—	101
Eriogonum marifolium var. *marifolium*	Sierra eriogonum	9109248	500	730	—	737
Eriogonum pyrolifolium var. *coryphaeum*	Alpine buckwheat	9109273	285	48	—	35
Penstemon davidsonii var. *davidsonii*	Davidson's penstemon	9109250	220	101	93	255
Phlox diffusa	Spreading phlox	9109253	290	—	32	18

South West Rim Drive

Crater Lake National Park						
Scientific Name	**Common Name**	**Accession**	**Plant Delivery (#)**	**Seed Delivery (g)**	**2016 Collection[1] (g)**	**Total seed in Storage[2] (g)**
Achnatherum occidentalis	needlegrass	9109228	—	—	—	370
Bromus carinatus	California brome	9109237	—	—	121	1899
Carex halliana	Hall's sedge	9109257	—	—	—	1189
Carex pachycarpa	many-ribbed sedge	9109241	—	—	955	2041
Elymus elymoides ssp. *elymoides*	bottlebrush squirreltail	9109243	—	—	—	665
Ericameria greenei	Greene's goldenweed	9109247	—	—	—	32
Eriogonum marifolium var. *marifolium*	Sierra eriogonum	9109265	—	—	—	1116
Holodiscus microphyllus var. *glabrescens*	bush ocean spray	9109264	—	—	—	74
Lupinus andersonii	Anderson's lupine	9109271	—	—	748	1006
Phlox diffusa	spreading phlox	9109274	—	—	16	12
car-pach, ely-ely, ach-occ mix	—	—	—	—	—	970

North West Rim Drive

Crater Lake National Park						
Scientific Name	**Common Name**	**Accession**	**Plant Delivery (#)**	**Seed Delivery (g)**	**2016 Collection[1] (g)**	**Total seed in Storage[2] (g)**
Achnatherum occidentalis	needlegrass	9109230	—	—	22	79
Aconogonon davisiae var. *davisiae*	Davis knotweed	9109232	300	—	46	32
Arnica viscosa	Mt. Shasta arnica	9109234	—	—	—	0.2
Carex breweri	Brewer's sedge	9109239	1000	—	112	295
Elymus elymoides ssp. *elymoides*	bottlebrush squirreltail	9109245	1500	—	—	1054
Ericameria greenei	Greene's goldenweed	9109283	—	—	21	62
Eriogonum marifolium var. *marifolium*	Sierra eriogonum	9109259	130	—	—	394
Eriogonum pyrolifolium var. *coryphaeum*	alpine buckwheat	9109269	—	—	—	41
Lupinus andersonii	Anderson's lupine	9109303	—	—	114	267
Lupinus lepidus	prostrate lupine	9109304	—	—	100	319
Penstemon davidsonii var. *davidsonii*	Davidson's penstemon	9109251	300	—	—	158
Phlox diffusa	spreading phlox	9109268	—	—	20	22

[1]Weight includes seed envelope
[2]Weight without seed envelope

Technology Development. Many species involved in this agreement do not have established propagation protocols. Seeds of Crater Lake species produced for delivery were sown into Ray Leach "stubby" (1.5 in. by 5.5 in., 6.5 cu inch), cone-tainers. The containers were filled with a sterilized peat-based media (ProMix BX Biofungicide + Mycorrhizae) and covered with a thin layer of vermiculite after being sown. Seeds that require cold/moist stratification to break dormancy were sown into cone-tainers, watered, wrapped in plastic bags, and placed in a walk in cooler. Seedlings germinated in either a cold frame or greenhouse in the winter and early spring. Plants were moved to a shadehouse in spring for the remainder of the growing season.

All of the container plants were fertigated biweekly with Jack's Professional 20-20-20 general purpose water soluble fertilizer throughout the growing season and were treated with regular applications of predatory nematodes for fungus gnat control while located in the greenhouse and/or cold frame. The Boechera plugs were attacked by flea beetles in the shadehouse in the summer and were successfully treated with several applications of Spinosad.

Collecting seed along roadsides in Crater Lake National Park, August 2016.

Crater Lake National Park and Corvallis Plant Materials Center staff, plant delivery. September, 2016.

Prepared by: **Meeker, Colorado, Upper Colorado Environmental Plant Center**

Introduction. Indefinite Delivery/Indefinite Quantity (ID/IQ) Contract AG-8B05-C-12-0002, Rimrock Drive Rehabilitation provided the avenue for Task Order P16PD00861 to be executed for seed production for Crater Lake National Park through the 2019 field season. Two separate sources of California brome (*Bromus carinatus*) and a bulked source of bottlebrush squirreltail (*Elymus elymoides* ssp. *elymoides*) have been established for seed increase. Depending on whether the bottlebrush can be harvested with a conventional combine will determine future adjustments to the task order as it now stands. Presently, seed is to be produced for a single year for the bottlebrush and three years for the brome. If the bottlebrush can be harvested with a combine, additional years of production are likely.

Accomplishments. In 2016, the Upper Colorado Environmental Plant Center planted fields of bottlebrush squirreltail and two sources of California brome. All fields are now established with seed production expected for years 2017-2019.

Crater Lake National Park					
Scientific Name	**Common Name**	**Accession**	**Field Size (Acres)**	**Planting Date**	**Amount Cleaned Bulk Seed Used (lbs)**
Bromus carinatus	California brome	SWRD	0.27	7/29/2016	0.5
		NEERD	0.20	8/4/2016	0.6
Elymus elymoides ssp. *elymoides*	bottlebrush squirreltail	NWRD, NWERD, NEERD			
		NEERD, SWRD, CWRD	1.03	7/28/2016	2.8
			1.17	7/29/2016	2.2
		Mix of seed from each collection site (5)	0.47	8/9/2016	1.0

Technology Development. Standard cultural practices and seed cleaning protocols, including seed treatment to prevent head smut, were utilized to produce seed of bottlebrush squirreltail and California brome.

Mount Rainer National Park, Washington

Prepared by: Corvallis, OR, USDA NRCS Plant Materials Center

Introduction. The Corvallis Oregon Plant Materials Center (ORPMC) entered into an agreement with Mount Rainier National Park in 2015 to evaluate, test, and propagate native plant materials for revegetation purposes (*Rehabilitate Nisqually-Paradise Road Project*). It was agreed that the Corvallis Oregon Plant Materials Center would establish, harvest, and maintain four seed increase fields of three species. Grasses were collected from two elevation zones and will be isolated from each other to prevent cross-pollination. A total of 175 lbs (PLS) are expected from two grasses from the mid elevation zone and 300 lbs (PLS) are expected from three grasses from the high elevation zone.

Activities in 2016 included maintenance, harvest, and seed cleaning of five seed increase fields. Details are provided below.

Accomplishments. Most of the fields looked good heading into spring of 2016 with the exception of the brome field. It appeared to go completely winter dormant and then re-emerge in the spring. Most cool season grasses are winter active with the majority of growth happening in March–May. This accession of brome did not emerge until late March. Very high temperatures were experienced early in the spring, and this seemed to halt vegetative growth on many species and triggered early flowering and seed set. The brome field was spotty and did not produce very much seed. The ripe seed from the field twice a week for three weeks was hand harvested to collect as much seed as possible from the field. All other fields for this project were harvested using a small plot combine.

Seed increase field sizes and direct seeding date are noted in the following table.

Mount Rainer National Park				
Scientific Name	**Common Name**	**Accession and Source**	**Planting Date**	**Field Size (Acres)**
Elymus glaucus	blue wildrye	9109226 (high)	09/22/15	0.35
		9109223 (mid)	09/22/15	0.25
Bromus carinatus	California brome	9109227 (high)	09/22/15	0.2
Festuca rubra	red fescue	9109225 (high)	10/01/2015	0.45
		9109224 (mid)	09/22/15	0.2

Mount Rainer National Park					
Scientific Name	**Common Name**	**Accession Number**	**PLS (lbs)**	**Clean Bulk (lbs) Inventory**	**Test Date**
Elymus glaucus	blue wildrye	9019226 (high)	37.5	44	12/30/2016
		9019223 (mid)	29	33	12/20/2016
Bromus carinatus	California brome	9019227 (high)	1	4	1/12/2017
Festuca rubra	Red fescue	9019225 (high)	96.7	132	12/21/2016
		9019224 (mid)	n/a	22	n/a

Technology Development. There were no deliveries in 2016. Seed will remain in the Corvallis Oregon Plant Materials Center seed storage facilities until requested by the park.

Mount Rainer National Park, *Elymus glaucus*, accession 9019226 (high), Corvallis, Oregon, 2016.

San Juan Island National Park, Washington

Prepared by: **Corvallis, Oregon, USDA NRCS Plant Materials Center**

Introduction. The Corvallis Oregon Plant Materials Center (ORPMC) entered into an agreement with San Juan Islands National Historical Park in 2016 to provide native plant materials for the restoration of the American Camp Prairie. It was agreed that the Corvallis Oregon Plant Materials Center would produce a minimum of 480 lbs (PLS) of *Elymus glaucus* (ELGL), 320 lbs (PLS) of B*romus sitchensis* (BRSI), and 480 lbs (PLS) of *Festuca roemerii* (FERO) (approximately 120 lbs per year of ELGL and FERO and 80 lbs per year of BRSI). The project is expected to be completed in 2020.

Accomplishments. A 1.5-acre field of Roemer's fescue was established in the fall/winter of 2015/2016, and the blue wildrye field was just recently planted in the fall/winter of 2016/2017. The brome field was also planned to be established in the fall of 2016/2017, but the field was too wet to seed in the fall. It will be established in the spring of 2017.

Seed increase field sizes and direct seeding dates are noted in the following table.

San Juan Island National Park				
Scientific Name	Common Name	Accession and Source	Planting Date	Field Size (Acres)
Elymus glaucus	blue wildrye	9079607	9/27/16	0.5
Festuca roemerii	Roemer's fescue	9079605	10/20/15	1.5

The Roemer's fescue field did not flower this year, which was unexpected. Usually this species flowers on its second year. Hopefully, the field will bloom in 2017.

There were no deliveries in 2016, old seed from a previous agreement is stored at the PMC. Details are listed below.

San Juan Island National Park						
Scientific Name	Common Name	Accession Number	Agreement Acreage	PLS (lbs)	Clean Bulk (lbs) Inventory	Test Date
Bromus sitchensis	Sitka brome	9079606	.5	114.8	131	11/17/2014
Festuca roemerii	Roemer's fescue	9079605	1.5	22	30	11/17/2014
Elymus glaucus	Blue wildrye	9079607	.5	168	211	11/17/2014

San Juan Island National Park, *Elymus glaucus*, accession 9079607, Corvallis, Oregon, 2016.

Yosemite National Park, California

Prepared by: **Aberdeen, Idaho, USDA NRCS Plant Materials Center**

Introduction. The Aberdeen Idaho Plant Materials Center (IDPMC) entered into an interagency agreement with Yosemite National Park (YOSE) in 2015 to produce containerized plants for the Yosemite Valley Day Use Parking Area (aka Camp 6) redesign project. The new day-use parking lot will relocate parking outside the setback for the 2-year floodplain of the Merced River, producing approximately 4.1 acres of former parking lot area to be restored to black oak woodland (1.9 acres) and palustrine wetland (2.2 acres), mostly within the riparian buffer. Target plant production for 2016 was 10,000 plants.

Accomplishments. Seed was delivered to the Aberdeen Idaho Plant Materials Center in the fall of 2015. Seeds of slenderbeak sedge (*Carex athrostachya*), Kellogg's sedge (*C. lenticularis* var. *lipocarpa*), fragile sheath sedge (*C. fracta*), woolly sedge (*C. lanuginosa*), blister sedge (*C. vesicaria*), Missouri iris (*Iris missouriensis*), Rydberg's penstemon (*Penstemon rydbergii*), panicled bulrush (*Scirpus microcarpus*), and western goldentop (*Euthamia occidentalis*) were planted into 10 cubic inch cone-tainers and placed outside for overwinter stratification on November 19, 2015. Greensheath sedge (*Carex feta*) was planted on February 1, 2016, and similarly placed outside for stratification. The remaining species have no stratification requirement for germination and were planted in April 2016. Over 11,000 plants were delivered to Yosemite National Park in the fall of 2016.

The following table reflects the plants requested and delivered in 2016 greenhouse production.

Yosemite National Park			
Wetland Species	**Common Name**	**No. Plugs Targeted**	**No. Plugs Delivered**
Agastache urticifolia	nettleleaf giant hyssop	200	382
Artemisia douglasiana	Douglas' sagewort	800	980
Asclepias speciosa	showy milkweed	800	1176
Carex athrostachya	slenderbeak sedge	200	387
Carex feta	greensheath sedge	600	803
Carex fracta	fragile sheath sedge	200	98
Carex lanuginosa	wooly sedge	400	49
Carex lenticularis	lakeshore sedge	600	294
Carex senta	swamp carex	800	568
Carex vesicaria	blister sedge	1000	1470
Euthamia occidentalis	western goldentop	400	586
Iris missouriensis	Rocky Mountain iris	400	0
Juncus effusus	common rush	1000	1297
Juncus balticus	baltic rush	400	98
Juncus occidentalis	western rush	400	0
Mixed spp.	—	—	803
Penstemon rydbergii	Rydberg's penstemon	400	977
Scirpus microcarpus	panicled bulrush	1000	1352
Solidago canadensis ssp. elongata	rough Canada goldenrod	400	0
	Total Plugs:	**10,000**	**11,320**

Yosemite National Park, greenhouse plant production, Aberdeen, Idaho, 2016.

Prepared by: **Meeker, Colorado, Upper Colorado Environmental Plant Center**

Tioga Road

Introduction. Yosemite National Park (YOSE) awarded Upper Colorado Environmental Plant Center (UCEPC) with the Indefinite Delivery/Indefinite Quantity (ID/IQ) Contract AG-8B05-C-12-0002, Task Order P13PD00746 on July 24, 2013. The project, Rehabilitate Disturbed Areas along Tioga Road Phase I, requires revegetation with native seed indigenous to Yosemite National Park. The task order identifies the Upper Colorado Environmental Plant Center to propagate, establish, and maximize seed production from two 0.5-acre fields of native grass, *Bromus carinatus* and *Elymus elymoides*. The seed source was provided by collections made from park staff. In 2016, Modification 2 was authorized for one more year of seed production of both species with the end date for the task order set for October 31, 2016.

Accomplishment. The Upper Colorado Environmental Plant Center produced seed of Yosemite sources of *Bromus carinatus* and *Elymus elymoides* in 2016. Because of the impending need for seed application in the fall, the 2016 crops of bottlebrush squirreltail and California brome were cleaned in September, samples sent in for seed testing, and all seed of both species from 2016 production was sent directly to the park in a single shipment on September 29, 2016. An earlier shipment on August 25 sent one pound of bottlebrush squirreltail to Yosemite National Park. Seed harvest information is provided in the following table.

Yosemite National Park						
Species	**Planting Date**	**Harvest Date**	**Field Size (Acres)**	**Bulk Clean Seed (lbs)**	**PLS (lbs)**	**Date Tested**
Bromus carinatus	7/26/13	7/11/14	0.5 acre	66	30.48	3/2/15
		7/15/15	0.5 acre	140	101.6	11/10/15
		7/10/16	0.5 acre	67	42.3	10/28/16
Elymus elymoides	8/1/13	7/21/14	0.5 acre	7	Shipped to Lockeford	NA
		7/27/15	0.5 acre	1.6	0.96	10/14/15
		7/7/16	0.5 acre	320 g	Shipped to park	NA

This contract is now complete.

Yosemite National Park, *Bromus carinatus*, Meeker, Colorado, June 2016.

Valley Loop and Camp 6

Introduction. Yosemite National Park (YOSE) used the Indefinite Delivery/Indefinite Quantity (ID/IQ) Contract AG-8B05-C-12-0002 to request native seed production for the park through Task Order P15PD03472 with the period of performance starting September 15, 2015, and ending September 30, 2018. The project, Valley Loop and Yosemite Village Day Use Parking Area Restoration and Revegetation, requires revegetation with native seed indigenous to Yosemite National Park. The task order calls for Upper Colorado Environmental Plant Center (UCEPC) to produce seed of ten species collected by park staff.

Accomplishments. *Bromus carinatus, Elymus glaucus, Poa secunda* and what was thought to be Leymus triticoides were planted for large-scale seed production in 2015. Also in 2015, *Achnatherum nelsonii, Achnatherum occidentale, Hosakia oblongifolia*, and *Acmispon americanus* were planted in small fields and plots. Good stands were realized for three of the large fields, but the Poa field established poorly, and none of the small plots established. The three fields that did establish in 2015 all produced seed in 2016. Also in 2016, *Elymus elymoides, Achillea millefolium, Lessingia leptoclada, Solidago elongata, Melica harfordii* were planted to replace the plot materials that did not establish, and *Achnatherum nelsonii* was replanted. Poa was collected again by Yosemite National Park staff to re-establish this field. However, the Upper Colorado Environmental Plant Center did an in-house germination test of the seed collected in 2015 and 2016 because of poor results in the field. Germination tests indicated low viability on both lots. To confirm findings, both lots were sent to the Colorado State Seed Laboratory, Bend Seed Extractory, and Oregon State Seed Lab for analysis. Additionally, seed test results from seed produced in 2016 indicated that what was thought to be Leymus triticoides from field collections has been identified as *Elymus trachycaulus*, or slender wheatgrass, through laboratory analysis. The following table recaps the materials planted and the planting date along with any applicable harvest information.

Yosemite National Park								
Scientific Name	Common Name	Field Size (Acres)	Planting Date	Bulk Seed Planted (grams)	Harvest Date	Bulk Clean Seed (lbs)	PLS (lbs)	Date Tested
Bromus carinatus	California brome	0.5 0.23	8/17/15 6/16/16	1744 243	—	—	—	—
—	—	0.73	—	—	7/5/16	58.5	42.85	12/26/16
Elymus glaucus	blue wildrye	0.5 0.5	8/14/15 6/16/16	516 410	8/1/16	—	—	—
	—	1.00	—	—	—	23.5	20.32	12/29/16

Scientific Name	Common Name	Field Size (Acres)	Planting Date	Bulk Seed Planted (grams)	Harvest Date	Bulk Clean See d (lbs)	PLS (lbs)	Date Tested
Festuca idahoensis	Idaho fescue	0.80	8/10/16	254	—	—	—	—
Achillea millefolium	yarrow	0.10	8/04/16 8/5/2016	6	—	—	—	—
Achnatherum nelsonii	Columbia needlegrass	0.06	8/11/16	46	—	—	—	—
Lessingia leptoclada	Sierra lessingia	.006	8/11/16	10	—	—	—	—
Melica harfordii	Harford's oniongrass	0.02	8/11/16	30	—	—	—	—
Solidago elongata	west coast Canada goldenrod	0.06	8/11/16	20	—	—	—	—

*Confirmed by Wyoming State Seed Laboratory

Specifically, 3.2 acres of field production along with three production plots are required for the task order. The Upper Colorado Environmental Plant Center planted 3.5 acres of increase material, including 3.23 acres of large seed increase and 0.27 acre of plots. Based on seed quantities and field sizes, three of the established grass fields were expanded in 2016, and a new product, Idaho fescue, was used to replace the Poa. The California brome field and slender wheatgrass field were increased to 0.7 acre each, and the blue wildrye field was expanded to a full acre.

On October 25, 2016, the Upper Colorado Environmental Plant Center sent 10 lbs each of blue wildrye and California brome and 15 lbs of slender wheatgrass to Yosemite as requested by the park on October 19.

Technology Development. The Upper Colorado Environmental Plant Center treated California brome seed with 'Dividend' fungicide to prevent potential head smut infection. No smut was observed in the 2016 brome seed field. Germination tests for the wildland collected Poa are included along with the seed tests for all produced seed.

Yosemite National Park, slender wheatgrass (*Elymus trachycaulus*), Meeker, Colorado, 2016.

NORTHEAST REGION

Gateway National Recreation Area, New York

Prepared by: **Cape May, New Jersey Plant Materials Center**

Introduction. In late October 2012, the coastline of Gateway National Recreation Area (GATE), which encompasses the Sandy Hook unit (New Jersey) and two units (Miller Field, Great Kills Park) on the southern side of Staten Island (New York) were dramatically affected by Superstorm Sandy. The natural ecosystems and some infrastructure were heavily damaged by the storm. In response to this need, the National Park Service (NPS) regional office in Boston contacted USDA-NRCS headquarters to request assistance of the Cape May Plant Materials Center with providing plant materials for revegetating the damaged dunes and shorelines. The Cape May Plant Materials Center and the Gateway National Recreation Area (GNRA) have a nearly 25-year relationship centered on plant materials for the restoration of dunes, marshes, and natural areas in the various park units. In addition, the Cape May Plant Materials Center has maintained some of the GATE germplasm of coastal plant materials in seed storage since the inception of this cooperative working relationship.

The most immediate need after the storm was to provide American beachgrass (*Ammophila breviligulata*) for initial stabilization of the dunes. A new beachgrass production field was established from beachgrass collected on the northern end (natural area) of the Sandy Hook Unit of Gateway. This new production field has produced an estimated 300,000 bare root plants in two growing seasons. In addition, this contract provides for production of two prime coastal shrubs, bayberry (*Morella pensylvanica*) and beach plum (*Prunus maritima*). Additional woody and herbaceous plants such as coastal little bluestem (*Schizachyrium littorale*), switchgrass (*Panicum virgatum*), coastal panicgrass (*Panicum amarulum*), sumac (*Rhus* spp.), eastern red cedar (*Juniperus virginiana*), and black cherry (Prunus *serotina*) were produced to add diversity to the beachgrass plantings.

Accomplishments. Although Gateway was provided vegetative culms of beachgrass for replanting, the Sandy Hook Unit beachgrass has been shown to produce a good quantity of viable seed. However, attempts to combine the seedheads with an agricultural small plot combine have proven unsuccessful so far. Hand harvesting the seedheads and running the inflorescences through a hammermill to remove the seed from the scales has been the most successful method to date. One germination trial conducted in a germination chamber resulted in an 88.5% germination rate.

Sandy Hook Unit germplasm beachgrass distribution is summarized in the following table.

Gateway National Recreation Area		
4000	Bare root culms	2/22/2016
1500	Bare root culms	4/15/2016
3000	Bare root culms	5/2/2016

Gateway National Recreation Area beachgrass production field **(left)** prolific beachgrass inflorescences **(right)**. Cape May, New Jersey, 2016.

Technology Development. In the fall of 2016, a short-term stabilization mixture was provided for a seeding at Jacob Riis Park. This seed mixture is intended to provide for short-term stabilization on a ½- acre area that was disturbed behind a bulkhead. Following the broadcast seeding, the site was mulched with switchgrass hay that had been harvested and baled at the Cape May Plant Center.

ABOUT THIS DOCUMENT

Visit the Plant Materials Program Website (http://Plant-Materials.nrcs.usda.gov) and the PLANTS website (http://plants.usda.gov).

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APPENDIX

Plant Materials Centers				
Palmer, AK	Alaska PMC	5310 South Bodenburg Spur Road	Palmer, AK 99645	907.745.4469
Tuscon, AZ	Tuscon PMC	3241 North Romero Road	Tuscon, AZ 85705	520.292.2999
Booneville, AR	Booneville PMC	6883 S. State Highway 23	Booneville, AR 72927	479.675.5182
Lockeford, CA	Lockeford PMC	PO Box 68, 21001 N. Elliot Road	Lockeford, CA 95237	209.727.5319
Meeker, CO	Upper CO Environmental Plant Center	5538 RBC #4	Meeker, CO 81641	970.878.5003
Brooksville, FL	Brooksville PMC	14119 Broad Street	Brooksville, FL 34601	352.796.9600
Americus, GA	Jimmy Carter PMC	295 Morris Drive	Americus, GA 31709	229.924.4499
Hoolehua, HI	Hoolehua PMC	PO Box 236	Hoolehua, HI 96729	808.567.6885
Aberdeen, ID	Aberdeen PMC	PO Box 296, 1691A South 2700 West	Aberdeen, ID 83210	208.397.4133
Manhattan, KS	Manhattan PMC	3800 S. 20th Street	Manhattan, KS 66502	785.539.8761
Galliano, LA	Golden Meadows PMC	438 Airport Road	Galliano, LA 70354	985.475.5280
Beltsville, MD	National PMC	Building 509, BARC-East, E. Beaver Dam Road	Beltsville, MS 20705	301.504.8175
East Lansing, MI	Rose Lake PMC	7472 Stoll Road	East Lansing, MI 48823	517.641.6300
Coffeeville, MS	Jamie L. Whitten PMC	2533 County Road 65	Coffeeville, MS 38922	662.675.2588
Elsberry, MO	Elsberry PMC	2803 N. Highway 79	Elsberry, MO 63343	573.898.2012
Bridger, MT	Bridger PMC	98 South River Road	Bridger, MT 59014	406.662.3579
Cape May, NJ	Cape May PMC	1536 Route 9 North	Cape May Court House, NJ 08210	609.465.5901
Los Lunas, NM	Los Lunas PMC	1036 Miller Street, SW	Los Lunas, NM 87031	505.865.4684
Big Flats, NY	Big Flats PMC	3266A State Route 352	Corning, NY 14830	607.562.8404
Bismarck, ND	Bismarck PMC	3308 University Drive	Bismarck, ND 58504	701.250.4330
Fallon, NV	Great Basin PMC	2055 Schurz Highway	Fallon, NV 89406	775.423.7957
Corvallis, OR	Corvallis PMC	3415 NE Granger Avenue	Corvallis, OR 97330	541.757.4812
Nacogdoches, TX	East Texas PMC	6598 FM 2782	Nacogdoches, TX 75962	936.564.4873
Kingsville, TX	Kika De La Garza PMC	3409 North FM 1355	Kingsville, TX 78363	361.595.1313
Knox City, TX	James E. "bud" Smith PMC	3776 Farm Road 1292	Knox City, TX 79529	940.658.3922
Pullman, WA	Pullman OMC	PO Box 646211, WSU	Pullman, WSU 99164	509.335.6892
Alderson, WV	Alderson PMC	PO Box 390, Old Prison Farm	Alderson, WV 24910	304.445.3005

For a current staff directory, please access: http://plant-materials.nrcs.usda.gov/centers/


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